LECTURES

ON

THE HARMONY

OF

SCIENCE AND REVELATION.

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PREFACE.

The relation in which modern scientific discovery stands to revelation, forms one of the most interesting and important subjects to which the mind can be directed; and to establish the harmony of science and christianity, is, by far, the most important problem of the age. The subject of the following lectures will, therefore, be regarded as one of paramount importance by all thinking minds. The thought however, may occur to some—why introduce such speculations from the pulpit?—Why make known doubts and difficulties raised by science, of which humble christians may never hear?—Why speak of subjects calculated to disturb the faith of believers, or to raise unpleasant doubts or scruples in the minds of professing Christians? Would it not be better to pass by such subjects, to ignore these startling discoveries, and to let people go on their usual way, believing their Bibles in a state of blissful ignorance about science. I venture to think that, in the present day, such a course would neither be wise nor worthy of the sacred cause of christianity. It would not be wise: for, in the present age, with all its magnificent appliances for the diffusion of knowledge, scientific discoveries are widely made known. You can scarcely take up a newspaper, or open a periodical, in which you will not find a reference to some of the great geological and astronomical discoveries of the day. The facts of science, therefore, are widely known, and must become increasingly objects of study. The most elementary school books embody the more important of them; and the minds of the young are, more especially, brought into contact with them. Suppose, then, the christian minister ignores such truths entirely, and passes them by as if they had no existence, the consequence will be that a suspicion will get hold of men's minds that he dare not look the facts of science in the face—that they are destructive of the claims of the Bible to be regarded as of divine origin; and thus gradually, in the minds of multitudes, the very foundations of faith and morals would be sapped and destroyed. It is impossible for any man of ordinary intelligence and information, to exclude altogether, from his mind, a knowledge of the conclusions of modern science. Plain, unlearned people, even, either in books or conversation, will inevitably come into contact with them; while the young are learning them in every well-conducted school. So that for people to read their Bibles, in a state of undisturbed ignorance on these points, is simply impossible. Surely, then, the wise course for the minister of religion is, not to ignore the grand discoveries of modern science, but welcoming them joyously, and meeting them honestly, to show that they accord with the truths contained in the pages of the Bible, and furnish no standing ground for infidelity.

Let us suppose that an individual sits down to construct a chart of a certain voyage, and that through fear of alarming navigators who have to follow the course he lays down, he omits all mention of certain dangerous rocks and shoals, though well aware of their existence; and let us suppose that, trusting to his chart, the mariner sails on in fancied security till the cry of "breakers a-head" strikes on his ear, and in another moment his vessel strikes, and is dashed to fragments; who but the constructor of the chart, who wilfully left him in ignorance of his danger, is accountable for the disaster? Would the religious teacher be less guilty, if he, through fear of disturbing his hearers, left them in ignorance of certain moral rocks and quicksands, on which he knows at any moment they may strike. And suppose again that a mariner, setting out on a voyage, should hear in a vague, uncertain way, of certain rocks, or sand-banks that lay in his track, but had no definite information of their situation, would it not be worse than cruelty to leave him in ignorance and uncercertainty, if we had the means of informing him where his danger lay.

Now, in the present day a vague suspicion has seized on many imperfectly informed minds, that such and such doctrines of Christianity have been shaken;—rumours of objections urged by scientific men are abroad; and whatever is vague and uncertain is conjured up by the imagination into something far greater than the reality. These objections, which in the distance and by report, are so vast and powerful, looked at close at hand, dwindle into utter insignificance. Christian wisdom and prudence therefore urge us to meet these difficulties manfully and openly, if we wish to counteract their evil tendency on many minds.

Besides it is utterly unworthy of the cause of our holy religion, which professes to rest on truth, and not to fear the most rigid examination, to shrink from confronting any of the established truths of science. Christianity courts inquiry: delights to come to the light; fears no adversary. Distant be the day when the advocates of Christianity shall shrink from encountering any foe; or hope to sustain their cause by taking refuge in any conscious fallacy; or, ostrich-like, hide their heads in the sand, that they may not see the danger, and thus expect to get rid of it. Such a course may be the result of zeal, but "it is not according to knowledge"—nor yet according to honesty.

The following pages contain a course of lectures, on the harmony of science and revelation, delivered on week-evenings, during the course of last winter. These lectures were so favourably received, when delivered, as to induce me to hope that they might be more widely useful, if committed to the printed page. In extenuation of all defects I beg to state that they were written amid the pressure of pastoral engagements, and that they are published as they were delivered, with but a few trifling corrections. It will also be remembered that, in presenting scientific truths to a general audience, the style and illustrations must be plain and popular, if we wish to engage attention; and all minute details, and lengthened references to authorities must be avoided.

M. H.

St. John's, 1*st November*, 1856.

LECTURE I.

In commencing a Course of Lectures on the Harmony between Science and Revelation it becomes necessary, first of all, to indicate the precise object aimed at, and the track which it is proposed to follow.—Looking at the relative positions occupied by physical science and Revelation, at the present hour, it would be difficult, I think, to over-estimate the importance of removing all apparent discrepancies between their teachings, and bringing into a clear light that beautiful harmony which really exists, whether we perceive it or not. To establish a perfect understanding between these two great departments of human thought would advance the best interests of both,—would purify and ennoble science, by giving it a high and holy purpose, and thus commending it to the affections of the Christian world,—and would place revelation on a loftier and surer pedestal, as being in harmony with the highest reason, and an anticipation of the purest philosophy. I may therefore justly claim for the subject I have ventured to take up, your serious attention, as being one of the profoundest importance,—one that has the closest bearings on the interests of our common christianity, and comes home to our every-day existence. And however imperfectly I may be able to discuss such a lofty theme, I feel assured that every honest endeavour towards such an end, will be welcomed, in the present day, by all thoughtful minds, however far short the performance may come.

It is not difficult to understand how a necessity arises, from time to time, for harmonizing science and revelation. That necessity has its foundation in the very nature of each, and springs from man's imperfect knowledge. Science, being an acquaintance with nature, is necessarily progressive, and, from small beginnings, struggles onward, amid many mistakes and imperfect theories, to something vast, certain and commanding. It is constantly receiving additions and accumulations, century after century; and to the end of time must continue an ever increasing quantity. Thus, continually presenting new aspects and larger results, its relation to revelation must of necessity vary from time to time; and the theory which at one stage in the advance of science suffices to harmonize its results with the teachings of revelation, will not be satisfactory after new fields have been explored and new harvests gathered. The bearings of these fresh discoveries have to be taken, and their relation to the truths of revelation ascertained. Hence the necessity, at different periods, for fresh adjustments between faith and reason. Besides, though the Bible, being the offspring of divine inspiration, is in itself complete and perfect, yet man's interpretation of the volume is imperfect, and like science, admits of corrections and improvements. Advancing knowledge has often rectified erroneous interpretations of the Bible; and what one age has held as the dictates of revelation, increased light leads a succeeding age to regard as a wrong deduction from scripture. This also necessitates frequently a fresh method of harmonizing science and revelation. An example will illustrate this point. Three centuries ago men believed that the earth was at rest, and that the sun and stars revolved round it, in the space of twenty-four hours. It was also held that the Bible sanctioned this view of the universe; and various passages were pointed to as teaching it most emphatically. About the same time science struck out the real, planetary arrangement—that the sun's motion from east to west is not real but only apparent, and is produced by the motion of the earth, on its own axis, in the opposite direction. The wonder-working telescope was soon after pointed to the skies; and the motion of the planets round the sun became a matter of demonstration, no longer admitting of doubt. Hence ensued, for a time, a most painful conflict; science was apparently at war with revelation. The contradiction was supposed to be complete; and pious minds, whose reverence for the Bible was strong, regarded the doctrine of the earth's motion as impious, and leading on to infidelity. The telescope was denounced as the enemy of religion, and an invention of Satan. The world, however, continued to move, notwithstanding ecclesiastical opposition, and the denunciations of doctors of divinity. The stubborn fact remained, and would not be ignored. At length men began to inquire whether the current interpretation of the Bible was infallible, and whether revelation really demanded their assent to the notion of the earth being at rest, and the sun and stars revolving round it. Even a brief consideration was sufficient to show that the Bible taught nothing, on this point, as *a matter of fact*, but spoke in language current among men when it was written; and, not being designed to reveal unknown scientific truths, it used the only phraseology that would then have been intelligible, when it referred to the earth as at rest, and the sun rising and setting. Thus harmony was at once restored;—good men bowed to the discoveries of science, and revered their Bibles as much as before, and at the present day no man reckons this as an objection to the truth of revelation. A simple principle of correct interpretation applied to the Bible, removed the apparent contradiction. The case furnishes an instructive lesson to all succeeding ages.

In the present age we have reached a similar crisis in the onward march of science. New discoveries have rapidly accumulated, and a collision between science and revelation is dreaded by many, and by others asserted to have actually taken place. Infidelity professes to triumph; many timid christians are apprehensive; the faith of some is shaken or overthrown. The real state of the case is, I conceive, that precisely the same thing has occurred now, as took place repeatedly in previous ages; —the relations of science and revelation require a fresh adjustment. The past half-century has witnessed advances in science so rapid and brilliant, as to throw all previous discoveries into the shade. Within that time, the new science of Geology has sprung up, attained giant proportions, and already occupies a front rank. Astronomy has immensely extended its conquests, and exhibits an array of the most dazzling discoveries. In Chemistry, Physiology, Electro-Magnetism, and all the other departments of natural science, vast strides have been made. The result of all is an immense enlargement of man's acquaintance with the universe—with the great forces at work therein, and the mighty laws that regulate the whole. In consequence of this, new modes of thought are insensibly making way—new ideas regarding nature, and man's relation to the things around him —new conceptions of the universe and its Almighty Creator. Old formulas are found insufficient, and are impatiently cast aside,—the intellect has outgrown them; and wider and grander views are substituted.—And, just as in previous ages, these new discoveries are felt by many to jar with their most cherished religious convictions; some of them seem to contradict what are regarded as the teachings of the Bible; and a want of harmony between them and our religious formularies and doctrines, is felt or imagined by not a few. The result is that many minds of intelligence, sensibility, and religious sincerity, are oppressed with painful doubts; their confidence in things they once regarded as settled is shaken; and while they are not sceptical, they are unsettled in their convictions. Others, again, who would gladly lay hold of any apology to get rid of the restraints and claims of religion, take advantage of this state of matters to neglect its instructions, or to proclaim their contempt for its requirements. Infidelity is daringly active; and exhibits its usual subtlety and skill, in fresh attacks upon christianity. Philosophy and religion have diverged so widely, that in the eyes of multitudes they seem to occupy hostile entrenchments, and to be at open warfare. Mean time, many of the master spirits of the age—men of warm piety and exalted intellect, conscious of the danger, have been and are labouring hard to bridge the gulf, and harmonize the results of man's intellectual progress with the dictates of his higher nature and the discoveries of revelation.—The results of their labours are inexpressibly valuable, and doubtless have cleared away innumerable difficulties, and brought nearer the great consummation—the complete harmony of facts and reason. Still, I think, admitting that great results, in various departments, have been accomplished, we yet wait for some master-spirit to appear,—some christian Plato, with all-comprehending genius, coming in the spirit and power of Chalmers—of expansive intellect and reverent heart—who shall gather up the great results of science, and combine them into one harmonious whole, and, by the eagle glance of his genius, shall strike out the higher law—" the law within the law,"—which will unite all true science in holy alliance with all pure faith. The age waits for this great reconciler. May God vouchsafe to send him soon!—Unhappy is the age when reason and faith are at war, and when religion ceases to be the guide of intellect, and the great regulating principle of the inner and outer life. We have fallen, undoubtedly, on some such epoch. And yet it is just one of faith's appointed trials—one of those struggles through which we are to be " made perfect." Faith's victory is not to be lightly won. Through " much tribulation "—many doubts and many fears, has the christian to pursue his onward march. Heaven alone, not earth, is destined to witness the repose of faith. We have seen that as man progressed in knowledge, the present conflict was becoming, each day, more inevitable. It may cheer us to know that those who have gone before us have passed through similar trials; and that christianity has again and again surmounted more serious dangers. Already we see enough achieved to warrant the belief that revelation will come forth " clear as the sun and fair as the moon,"—and that no genuine result of science will ever be found discordant with the Bible when fairly interpreted. One by one all difficulties are disappearing. Science is rapidly becoming more animated with the spirit of religion, and religion more embued with the spirit of true philosophy; and thus the day cannot be far distant when both shall appear, hand in hand, and unite with one voice in the burden of the angels' song, " glory to God in the highest—on earth peace, good-will to men."

Rightly considered, it is impossible that any permanent discord can exist between science and revelation. If misunderstanding appear, it must arise either by some falsity propounded by science, or some falsity attributed by man to the book of revelation, but which has in reality no place there. Let us never forget that nature, which it is the object of science to investigate, is as truly divine as the written volume of revelation.—Both are but two volumes from the hand of the same Almighty author. Let both be correctly interpreted, and there will be no contradiction.—Read each record aright, and the author will not be found to assert one thing in nature and the opposite in revelation. The starry scriptures of the sky cannot be at variance with the writings of " holy men of old who spake as they were moved by the Holy Ghost." The lines traced by the Almighty hand, in the stony volume beneath earth's surface, if the mysterious hieroglyphics are correctly deciphered, will be found in beautiful harmony with those scriptures which were " given by inspiration." The works of the Great Architect cannot give the lie to His word. What is this great universe—with its suns and galaxies—its myriads of planets and comets sweeping their majestic rounds through space—what is our earth, with its glorious cloud-capped mountains and ever-resounding seas, and all its sister globes moving on in divine harmony—what are all but the embodiment of a divine idea—a realized thought of the Infinite mind! The universe is that imperial robe which Deity has wrapped around him —"the garment by which we see Him"; and having worn this regal mantle for ages, He "folds it up as a vesture" and lays it aside, while he is the same from everlasting to everlasting. All existed as a thought originally in the mind of God; the universe is its expression. And so with regard to the volume of revelation—it also consists of divine ideas robed in human language—the thoughts of God taking form and substance, to our minds. By these two voices, the burden of which is different, God speaks to us; but the truths they utter are divinely harmonious. How baseless, therefore, are the christian's fears of science, as hostile to revelation! How vain the infidel's hope that reason would explode faith!—Let us dismiss these jealousies and apprehensions, in reference to science, as unworthy of christianity. True science can never injure religion.—Let us welcome every fresh discovery, being persuaded that all will advance the interests of everlasting truth. The Bible has suffered nothing as the human intellect has advanced—it dreads not the light—it has nothing to fear from the march of mind;—and after all the achievements of science and philosophy, it now stands on a loftier pedestal, and encircled by a diviner beauty than ever. From her great rounds of investigation star-eyed science will ever return proclaiming "the God of nature is the God of the Bible."

But while as christians we firmly believe that such will be the result, we are not to expect it to be brought about without effort on our part—without a hard contest and a long-drawn battle. Infidelity will contest every inch of ground, as it has done since the days of the Apostles. Beaten from one defence, it occupies new ground and renews the combat. Its old positions have all been forced—its old fortifications blown up and laid waste; but the campaign is not ended; the enemy has taken up fresh positions, and here he must be attacked—not behind the old lines of defence which have been abandoned. It has ever been the policy of infidelity to seize upon new discoveries in science, before they were reduced to system, and in this crude state to turn them to its own advantage. Thus the revelations of astronomy were treated in former days; and thus the discoveries among the ruins of Egypt and other eastern empires, were hastily seized on by infidelity, only to be as hastily abandoned. And pursuing the same policy now, infidelity is endeavouring to entrench itself behind modern physical science. Here, possibly for some ages to come, the battle will rage. On this ground the enemy must be encountered, unless we yield him the victory. Hence the pressing call for all who would stand forward as defenders of the faith, to make themselves masters of the weapons that must be wielded;—to become familiar with the processes and results of modern science. Without such equipment they cannot cope with the champions of infidelity. The study of theology alone will no longer suffice. To denounce or ignore modern scientific discoveries will only expose the man who does so to pity or contempt; and the greatest injury to the cause of christianity will result from such a course. It would be well if all christians, especially all teachers of religion, in the present day, were to ponder the warnings uttered by the distinguished author of "The Foot-prints of the Creator."—Mr. Hugh Miller—whose reputation as a man of science is more than European, and whose theology is as sound as his science, has put forward the following warning admonitions:—"The clergy, as a class suffer themselves to linger far in the rear of an intelligent and accomplished laity,—a full age behind the requirements of the time. Let them not shut their eyes to the danger which is obviously coming. The battle of the Evidences will have as certainly to be fought on the field of physical science, as it was contested in the last age, on that of the metaphysics. And on this new arena the combatants will have to employ new weapons, which it will be the privilege of the challenger to choose. The old, opposed to these, would prove but of little avail. In an age of muskets and artillery, the bows and arrows of an obsolete school of warfare, would be found greatly less than sufficient, in the field of battle, for purposes either of assault or defence." Few are so well qualified, as the writer of these weighty words, to estimate the extent of the danger, and to lead in the way he has pointed out. And we have reason to thank God that there are at the present hour, many such men—of enlightened views and varied attainments,—masters in science, and yet having hearts embued with a love of the Bible.

In all attempts at harmonizing science and revelation, there is, I conceive, one most important principle to be kept in view, in reference to the way in which the Bible speaks of the operations of nature. Its object is not to teach science,—but the way of salvation. Hence, if we should go to the pages of the Bible, expecting to find there the system of modern astronomy, or anticipations of the discoveries of geology or magnetism, we should be disappointed. God has spread around us the wonders of his creation, and gifted man with faculties which enable him to investigate and comprehend these; and thus he has invited his rational creatures to a study of his works. This very study is fitted and designed to expand man's intellect, and invigorate his powers. The effort that is called forth, in unveiling the secrets of nature and questioning her closed lips, imparts strength to man's intellect, and elevates him in the scale of being. Had God, therefore, in his volume of revelation, disclosed the great secrets which human genius was to discover, and thus anticipated the results of science, no field would have been left for the exercise of man's intellect. The mental discipline now furnished by the study of the works of creation, would not have been provided; and there would have remained no motive for exertion in the pursuit of knowledge. The author of the Bible, did not therefore make scientific truth a subject of revelation. To do so would have been to injure, not benefit, man. Since then the Bible was not designed to make any authoritative announcements regarding the condition of the material universe, and the laws that regulate its operations, it could only refer to the work of creation in such language as would be intelligible to those whom it originally addressed, and in accordance with existing views, when it was written. We have no reason to suppose that the inspired writers of the Bible were gifted with any scientific knowledge beyond that of their age and country. They looked at nature, with eyes enlightened only by existing knowledge, and consequently spoke of it in the language of their contemporaries. In no other way could they have been understood by those for whose benefit they wrote. Suppose that instead of referring to the sun as rising and setting, and the earth as at rest, they had been supernaturally gifted with an insight into the scientific fact, and spoke of the earth revolving on its axis and flying round the sun, they would have been utterly incomprehensible and would have exposed themselves to scorn or suspicion. Accordingly we find that in condescension to human weakness or ignorance, God, in the book of revelation made use of existing modes of thought and expression, and the ordinary forms of language, when referring to the works of creation. To the Israelites these divine communications were addressed; and it pleased the All-Wise to adapt these to the comprehension of the people to whom he was imparting instruction. Their knowledge of the outward universe—their ideas regarding the relations in which they stood to the beings and circumstances around them,—were all made use of as media for bringing the divine revelation within their grasp; and the forms of speech with which they were familiar were strictly observed. Only in such a way can we conceive of a revelation from God to man as being a possibility—only thus could it be received and comprehended. Hence we find throughout the Old Testament, the Hebrew ideas and modes of expression complied with, when reference is made to the visible creation. A few examples may be quoted in illustration of this point:—We find repeated references to the earth as at rest, and the sun as in motion round it,—Thus it is said that God "laid the foundations of the earth that it should not be removed for ever." "For he hath founded it upon the seas and established it upon the floods." "It shall not be moved for ever and ever." "The sun rejoiceth as a strong man to run a race. His going forth is from the end of the heavens, and his circuit unto the ends of it." "Look now towards heaven, and tell the stars if thou be able to number them," said God to Abraham, "so shall thy seed be." This is evidently a condescension to existing ideas regarding the number of the stars; for even in an eastern clime not more than fifteen hundred are visible; and the numeration of them is an easy matter. The Hebrews fancied that at a certain height above the earth, there was a solid concave hemisphere, in which the stars were fastened, and on which rested a celestial ocean, which discharged itself in rain. Hence we find the Bible speaking of the (" waters above the firmament," and) " the waters above the heavens"—and the openings as " the windows of heaven." They believed thunder to be " the voice of God;" and the lightning some kind of fiery substance like burning wood, we read therefore, " The Lord also thundered in the heavens, the Highest gave forth his voice—hailstones and coals of fire." These examples will be sufficient to prove that in its references to natural objects, the Bible adapted itself to the existing knowledge, the thoughts and expressions of the age in which it was written; and made no revelation of scientific truths.

But while I admit to the fullest extent that the inspired writers were not made acquainted miraculously with the secrets of nature, which science is continually unfolding,—and while I acknowledge that the language of the Bible is not scientific, but popular, when speaking of natural phenomena,—I would as firmly hold that the simple phraseology which was intelligible to the Jews, has frequently about it an expansiveness and universality which render it the very best we can employ, in ordinary circumstances, with all our scientific progress. How strange to find that the language which conveyed to the uncultivated mind of the Jew, the child-like views of nature then reached, also expresses, in innumerable instances, the loftiest results of modern science. There were a hidden grandeur and fulness of meaning in its utterances, which neither the inspired writers themselves, nor those to whom they spoke, were enabled to comprehend; but which are every day becoming brighter and clearer, as the discoveries of science advance. And herein, I think, it is that we may discover the stamp of divinity, even in those portions of the Bible that speak of natural objects and operations. Science does not get in advance of these; but finds their fulness of meaning more than sufficient for all her disclosures. Thus, for example, when Moses penned the first chapter of Genesis, I do not think that he was gifted supernaturally with that knowledge of the earth's age, history, and revolutions, which geology discloses. What his own ideas of cosmogony were, or what conceptions his words conveyed to the Jewish mind, we cannot say: but we may reasonably suppose that the full meaning of his own language was not made known to him,—just as the full meaning of many prophetic announcements was concealed from the men who were inspired to utter them. And yet, strange to say, the Mosaic record of creation, as I hope to prove to you, is in beautiful accordance with the discoveries of Geology; and is corroborated by these in its grand outlines. If this be so, I ask, does it not stamp the divine origin of that wonderful record? Could an uninspired man, in such an age of the world as that in which Moses lived, construct an account of creation which would suffice for simple-minded men, and yet also be found in accordance with science in the 19th century? And in such a method of veiling the truths, and wrapping them up in mystic or symbolic language, so that the revolution of ages alone would fully bring them to light, there is nothing out of the ordinary course of revelation. The apostle Peter tells us that the full meaning of their own announcements was not made known to the prophets; after ages alone discovered it; and every succeeding age brings out new disclosures. Is there any thing more unreasonable in supposing that Scripture references to natural objects were but imperfectly understood, in many instances, by the writers themselves, and those whom they addressed; and that revolving ages, and the progress of man's mind, should bring out into clearer and fuller light the hidden grandeur of meaning involved in their weighty utterances? This seems to be in accordance with the general law by which God has imparted his revelations to man. And hence it is that science cannot leave revelation behind; but finds itself, in its loftiest flights, a commentator and illustrator of the sacred record. When "the monarch-minstrel" turned his gaze upon the starry vault, and exclaimed "when I consider thy heavens, the work of thy fingers, the moon and the stars which thou hast ordained, what is man that thou art mindful of him, or the son of man that thou visitest him," have we not in this glowing language, a sublime comment on the wondrous disclosures of modern astronomy; and even a Newton or a Herschel can give utterance to no grander conception of the universe, after all their study of the heavens. I do not say that the true system of those heavens was revealed to the soul of David,—that he had unravelled "the mystic dances of the sky,"—or understood the vastness and grandeur of the universe as science has now revealed it;—but whatever may have been his thoughts regarding the deep-rolling heavens gemmed with stars, his language has not become antiquated, as science advanced, but has a depth and grandeur of meaning which astronomy has not yet surpassed or exhausted. And again when Solomon said "all the rivers run into the sea, yet the sea is not full; into the place from whence the rivers came thither they return again,"—I do not think, with all his wisdom, that he was made acquainted supernaturally with the laws of evaporation, and the circulation of the atmosphere, as brought to light by modern research; and yet how accurately his words express the results of science! The water of the ocean, evaporated by heat, ascends and forms the clouds;—these are drifted about by the winds till intercepted by the peaks of hills and mountains; and thus in the very place that rivers have their origin, "thither they return again." How can we account for this but by referring it to inspiration? So when in the book of Job it is said, "He stretcheth out the north over the empty place and hangeth the earth upon nothing," we need not suppose that the great law of gravitation, by which the earth is sustained in its orbit, was present to the mind of the speaker, or that he knew the north to be the quarter of the heavens least thickly studded with stars —comparatively "the empty place"—as the telescope discloses; and yet could the modern astronomer find language more precise and vivid to express these great truths? The greatest discovery of modern times is the fact that the earth is swinging round the central sun, upheld by the invisible power of gravitation; and yet language could not express the matter more impressively than the oldest record in the world has done—"He stretcheth out the north over the empty place and hangeth the earth upon nothing." Unconsciously, almost, the lips of the speaker uttered the words; but their full meaning did not become apparent till the illustrious Florentine pointed his telescope to the heavens, and Newton discovered the law of gravitation. In this way it is that science is made religion's handmaid, and bears witness to the divine origin of the Bible; and thus, as years roll on, the halo of glory that surrounds the Book is becoming brighter and brighter. Science takes its flight into the distant starry spaces, or goes down into the depths of earth and reads the stony history of our planet, and then returns but to lay fresh tributes at the feet of revelation.

I would earnestly request my hearers to bear in mind, during the investigation on which we have now entered, the principle I have thus endeavoured to explain and illustrate. It seems to me to meet all the difficulties of the case completely,—establishing the inspiration of the Bible, while it keeps clear of the absurd notion that its writers were made miraculously acquainted with all modern science; and by allowing a hidden scientific as well as prophetic meaning in many parts of scripture, which the lapse of ages is to unfold, it thus gives the freest scope to the investigations and discoveries of science, and invests them all with a sacred character.

We may therefore enter on the subject before us without any trembling misgivings—without any fears of finding science the foe of revealed religion. It would be sad indeed if we must reckon the fairest and noblest product of human genius the enemy of that religion which has "brought life and immortality to light," and pointed the way "to glory, honour and immortality,"—if science, that has already brought such benefits to man, and beautified and elevated his existence, should be found to war with his faith. We may rest assured it is not so;—both are designed to advance human culture and well-being, in time and eternity, and both are in harmony. Science is quickening and expanding that intellect which is the gift of God, by making man acquainted with his Creator's mind as discovered in His works. It has enlarged our views of the grandeur of God's universe, and consequently of the Creator's attributes—it has thrown out great sounding lines into the fathomless gulfs of space—tracked the comet in its fiery course,—weighed the earth and all her sister planets,—discovered the lonely Neptune pursuing his path on the outskirts of our system,—made the dim nebulæ of the firmament burst into blazing suns,—dived into the abysses, and read the divine law reigning alike in the distant and the near, and returned proclaiming "God is in this place,"—"His order guides and upholds the Infinite Cosmos." And thus science has hung up new lamps in the firmament, whose rays light the way to the throne of God;—it has flung open the everlasting doors of the King of Glory, and invited man to enter and worship in the temple of immensity. It has brought glory to God, and has glorified our common humanity, by elevating it to a higher level. Descending to earth it has beautified and blessed human existence,—given man command over the rude powers of nature—enabling him to subdue the earth and bridge the ocean—to make the lightning his messenger, and the steam his servant—lightened his toil and multiplied his means of subsistence—and promising to bind together, as one family, all the children of our Father in the bonds of love. It seems like profanity to call science, which does all this, irreligious.—That cannot be godless which at every step proclaims an Almighty Father's presence, and tells us that there is a heart of love beating warm towards us, behind the curtain that shrouds the invisible. We might well weep, in heart-broken loneliness, if the teachings of science required us to cast aside the Bible,—if the revelations of a Newton, a Herschell or a Humboldt, shook our faith in the higher and holier revelations of Isaiah or Paul. It is not so:—the voice of science coincides with that of revelation; and both unite in proclaiming—

"These are Thy glorious works, Parent of good,
Almighty! Thine this universal frame
Thus wondrous fair! Thyself how wondrous then,
Unspeakable! who sitt'st above these heavens,
To us invisible, or dimly seen
In these Thy lowliest works; yet these declare
Thy goodness beyond thought, and power divine."

LECTURE II.

The illustrious astronomer Kepler, after a life spent in studying the mysteries of the starry heavens, was about to step from time to eternity, and doubtless to obtain a more enlarged knowledge of that glorious universe of which his earth-bound spirit had only a few faint glimpses here. He had devoted a long life to the great purpose of revealing to his fellow creatures the glory of God in His works; and had laboured for this end, amid poverty, neglect, and sore trials of flesh and spirit, as few have ever toiled. At last the great object for which he had struggled was attained,—his laborious calculations and observations had wrung from those silent orbs floating through space, the great law that rules their movements—the divine order according to which all sweep around the sun;—a discovery which led the way to Newton's revelation of the grand secret of gravitation, and thus lifted the mystic veil from the fair face of nature. It was when the truth had flashed upon Kepler, in all its brightness, and the long dreamed of music of the spheres had burst upon his ravished ear, that he exclaimed, in pardonable exultation, "I have stolen the golden vases of the Egyptians, to build up a tabernacle for my God, far away from the confines of Egypt. If you forgive me I rejoice—if you are angry I can bear it—the die is cast, the book is written, to be read either now, or by posterity—I care not which: it may well wait a century for a reader, as God has waited six thousand years for an observer." His great spirit, imbued with an unquenchable thirst for beauty and harmony, was now satisfied; and he felt that the truth he had grasped could never be lost. Whether his contemporaries appreciated his discovery, or whether posterity alone should know its value, mattered not to himself personally; and the great thought arose in his mind,—For six thousand years the Divine Author of all this order and beauty has been waiting for an intelligent creature to comprehend and adore; cannot then a poor humble toiler on earth wait a century for his discovery to make its way, and enlighten and bless his fellow creatures. It is, indeed, wonderful to think that for six thousand years the heavens had been declaring God's glory, and yet how low were men's thoughts of the grandeur of creation—how far short of the reality were their narrow conceptions—how little of all that glory had any intelligent, earthly creature comprehended. All that time men had looked up to the glittering firmament, and beheld the silver moon leading on the starry fold, as night having

> "Her sable skirts all fringed with light,
> From the celestial walls,"

descended on wings of gloom. With diamond brightness those twinkling orbs looked down upon them, and vainly whispered of the hidden splendours. Man recognized them not. He fancied his little world was "the be all and the end all" of God's works;—that a glassy sphere, studded with bright points, was whirling round the earth, the centre of the universe, and that the stars were made but to glimmer for him during the hours of darkness. That those glittering specks were flaming suns, lighting up unseen worlds in the depths of space, the homes of other creatures of God, exceeding in number all computation;—that sister globes were, like the earth, dancing round the sun, and these of a magnitude that put the earth into insignificance; and that this world, with all its inhabitants, is only as a grain of sand upon the sea shore when compared with Creation's vastness—this did not enter into the wildest dreams of sage or poet; and only after six thousand years of waiting did the true grandeur of the universe flash upon the human soul. Only after this long flight of centuries have the quenchless longings of man's immortal spirit found a field to expand in, and a meet temple for worship. Now we gaze upward into fathomless night, where every shining orb whispers of others more remote; and we are brought face to face with the Infinite. And as eternity flows on, here is ample field for man's spirit to soar nearer and nearer to the Divine source of all goodness, and glory, and blessedness.

And to take another view. God waited more than six thousand years before many of the wondrous workings of His hand on earth were unfolded to awaken man's adoration. We have been even more blind to the stupendous works of God, in the miracles of creative energy displayed here on earth, than to the magnificence of the deep-rolling heavens. The wonders beneath our feet—the marvellous records written by the finger of God, on rocky tablets, and on the foundations of the everlasting hills, no less proclaim the majesty of the Creator than suns and galaxies. A history of the great processes of creation—of the phases through which earth has passed—of the strange races of organized beings that have succeeded each other and now sleep in their stony sepulchres—of the uncouth forms that were earth's monarchs for ages before man, the high-priest of nature, was ushered upon the scene—a history of all this was indelibly engraven "as with an iron pen, on the rock forever"; but the great volume has only lately been opened, and but a few chapters are yet read. Poor, short-visioned man fancied that six thousand years ago, creative energy first went forth; and that then, out of nothing, this globe sprang, in a moment, into existence. What the Almighty creative impulse had been operating away back in the past eternity, during periods beyond the powers of human calculation to tell,—that for myriads of centuries, life, in its varied forms, had been leaping and exulting on earth,—and that before man, the youngest born of God's creatures, this stage of being was successively occupied by lower existences that have passed away for ever, and are only known from their petrified remains,—that this should all have been an unwhispered secret till within the memory of living men, shows how limited is our knowledge, and how small a proportion the known bears to the unknown. Just as, on the one hand, astronomy has imparted vastly enlarged views of the extent of God's universe, so on the other, geology has immensely extended our conceptions of those immeasurable periods of the past eternity during which creative energy has been operating. In view of these more expanded views, how poor, and unworthy of the Great Creator, do the narrow conceptions of former ignorance now appear! Can we doubt that all these advances in intelligence are imparting worthier ideas of His glory who is "mighty in working"? All tell us that to the Everlasting, "one day is as a thousand years and a thousand years as one day," for time is nothing to Him in whose sight a "thousand years are but as yesterday when it is passed, or as a watch of the night." To the Eternal One, six thousand years of waiting are but as a fleeting moment to ourselves.

I have now to ask you to accompany me while I attempt a brief and necessarily imperfect sketch of the revelations of that science which has already unfolded grand views of the Creator's majestic plans of working, in the ages that are past. Having got a general idea of the conclusions to which the geological record leads, we shall then be in a position to compare these with the account furnished in the book of Genesis.

Geology is that science which investigates the structure of the globe—the material of which it is composed—the changes through which it has passed—and the vegetable and animal races that have existed on its surface. As a science, it does not date more than sixty years back: but with such ardour and skill has it been prosecuted—so great a mass of talent has it attracted to its investigations, that already an amazing array of facts are accumulated, and its grand principles may be regarded as incontrovertibly established. The first great revolution which this science produces in the ideas of those who make its acquaintance for the first time, is in regard to the changes through which the surface of the earth has passed, and the length of time occupied by these. It finds that the alterations which the surface of the globe has undergone since man and the existing races of animals became its tenants are comparatively insignificant. True indeed the mountains and hills have been crumbling under the action of air and water—the ocean waves have been dashing against the cliffs and undermining their bases and encroaching in many places on the land—the rivers have been wearing their channels deeper and wider and carrying the spoils of the land away into the ocean's bed; but the changes thus produced, since Adam's day, are comparatively trifling. The relative positions of land and sea have not altered to any measurable extent, —the outlines of continents and islands, the courses of rivers, and the elevation of mountain-chains, are pretty much the same now as when Eden received our first parents in its peaceful bowers. Change has been going on, but so slowly and gradually that after six thousand years its results are scarcely perceptible. But then geology carries us away back far beyond man's brief day on earth, and finds records of vast changes that then took place, requiring immense periods of time for their accomplishment. Thus for example, the geologist finds on examining the different layers beneath the surface of our present continents and islands, that what is now dry land was formerly the bed of an ocean, tenanted by marine animals and plants; and going deeper, he finds proof that these continents have been alternately the bed of seas and the surface of dry land for long ages. Nay more,—he finds that the loftiest mountains on earth—the Himalayas and Andes and Alps, were formerly submerged by the ocean, were once bottoms of seas; and as a natural inference he concludes that where the ocean now rolls blooming continents once stood. Ships are sailing and the finny tribes disporting themselves over the submerged ruins of great continents and islands. The proofs of all this are plain and incontrovertible—they appeal to the senses. The solid substance of these continents consists of layers of enormous depth, that have been deposited as sediment at the bottom of the seas and are full of vast accumulations of sea-shells and other marine remains. More extraordinary still—the rocks composing our highest mountain-chains have been deposited by water, layer upon layer—sea-shells being found embedded at their very summits—thus demonstrating that their materials have been raised out of the depths of the sea. Again and again have land and ocean thus changed places: continents have become ocean-beds, and ocean-beds continents, and mountain ranges. But now arises the question, can we account for such extraordinary transitions,—can we discover the process or point out the forces by which the bed of a sea is changed into dry land and becomes a flower-clad landscape; and by which mountain peaks and great tracts of country are submerged by the ocean? The answer to this involves a reference to some of the most magnificent discoveries and majestic laws that geology has disclosed.

The investigations of science have made it clear that change is an appointed law of the universe. Great forces are in operation under the action of which every terrestrial thing undergoes change, more or less swiftly, according to its nature. The particles of matter are in continual circulation,—in perpetual motion. The inorganic portions of the earth—the clay and stones—enter into the plant and form its substance—the plant becomes the animal—the animal dies and returns to dust—and the same process is repeated again and again—so that there is perhaps little of the solid materials around us that has not been repeatedly alive, in the form of plants or animals. But these are only instances of change on a limited scale. The earth itself, regarded as a solid mass, is under the operation of the same great law. Two great processes are found to be in operation, under the influence of two great antagonistic forces. The one is named the disintegrating or degrading process—the tendency of which is to reduce all things to a level. Look around, and you will see it every where at work. Slowly but surely it is crumbling down the loftiest mountains—eating away the hard granite and quartz—sapping the foundations of the hills and reducing their altitude by imperceptible degrees—employing the avalanche—"the thunderbolt of snow"—the irresistible glacier—the mountain-torrent, the cataract, and at times the lightning's shivering stroke, as its agents; while the tiny streamlet—the falling rain, the gentle dew and the flowing river are more silently doing its work. The all-enveloping atmosphere is also one of its slow, but most powerful operators. Its tendency therefore is to throw down all existing elevations to the lowest level—to hurl the mountains and hills into the valleys, and by means of rivers to sweep the whole into the bottom of lakes and seas. This great destructive process has been going on since the first creative fiat went forth, and it is active as ever. It is one of the great laws under which God has placed the material universe. Only allow sufficient time and under its action all existing continents, islands and mountains would be deposited at the bottom of the ocean, and the waters would flow over the whole. The ocean-waves are hurling themselves against the land—encroaching on its boundaries—and the rivers are carrying away the particles of the land and depositing them at the bottom of the ocean. And if there were no counteractive force at work, to repair these ravages, there could be no dry land on the face of the globe.

But there is another great antagonistic force at work, meeting and counteracting the levelling process; and it is on the balance of these dualistic tendencies that the safety of our world depends—that the existing order is preserved and the globe prevented from becoming a watery waste. There is an upheaving or elevating force at work, the tendency of which is to raise upward the solid crust of the earth, as that of the other is to depress. This great force is imprisoned in the heart of the earth, and is no other than the internal heat which may be said to constitute its vitality. The interior of the globe is now clearly ascertained to be in a state of fusion by heat, and to possess a temperature, in all probability, far higher than any that man can produce. We may fancy an enormous furnace filled with molten matter—a raging sea of boiling lava, surging to and fro, imprisoned in a solid crust, on the surface of which we walk, and we have some faint idea of the condition of our planet's interior. It is probable that thirty miles beneath the surface of the globe all things are in a state of constant fusion by heat—like glass in a furnace. The streams of boiling lava that flow from the mouths of volcanoes are little rivulets from the great molten fountain within. We all know the expansive force of heat, and we can form some slight conception of the energy with which this ocean of fire must press upon the outer rind or crust of the earth—constantly forcing it outward in all directions. Where the crust is not sufficiently strong to resist it a volcanic eruption occurs, or an earthquake rends the solid mass and swallows up whole cities and districts. Thus we are whirled through space, on the surface of an earth-ball, having a raging, fiery furnace beneath our feet. But like all the arrangements of the Creator, this one is a manifestation of wisdom and goodness. This internal fire is the great conservative power of our globe, counteracting the great destructive process by raising up from the bottoms of seas new continents and islands and mountain-ranges. Its direction is to elevate the surface. By its agency all existing lands have been slowly upheaved from the depths of ocean. Pressing perpetually on the yielding crust it lifts the depressed portions upward, and at length they bid defiance to the waves and enjoy the sunshine. The Creator clothes them in verdure—calls into being race after race;—and at length man steps on the scene—covers the surface with cities, palaces and homes, and has dominion over the works of God's hand. Then having served its purpose this platform of being may again be overflowed by the sea and again become an ocean bed, to be raised again in the great revolution of time's epochs. So wonderfully has the Almighty Creator constructed this scene of existence!

Now let us keep in mind that these two great forces—the upheaving and degrading—have always been at work since the world emerged from chaos; and they have been instrumental in producing all previous changes and will doubtless bring about all future revolutions. Side by side, therefore, creation and destruction have ever been going on and are so at this moment. The same causes that are now producing changes have been at work, with greater or less intensity, always. Let us then take an example of the way in which a continent is formed, in order to realize the creative process, and obtain a clearer idea of the circulation of the great masses—the mountains, plains, and oceans, from one to another. Suppose that instead of the insignificant rivulet that falls into our harbour, a great river here discharged its waters into the ocean like the St. Lawrence or Mississippi. We shall suppose that it had a lengthened course from some high table-land or mountain range far in the interior. It flows on for centuries, carrying with it portions of the land, and forming sedimentary deposits at the bottom of the ocean where it empties its waters. Now of what would the beds thus formed outside the bar of our harbour consist?—Clearly of portions of the soil through which the river is supposed to flow; and as our soil is in a great measure sand and gravel, these elements would predominate. But besides that, some plants would be carried down by a large stream, and fallen trees—such as pines and firs—shrubs and those on which our wild berries grow. In addition to these natural productions those that are the results of human culture would in some instances be washed down—some barley or wheat plants—or a specimen of the potato or turnip. These would be embedded in clay and gravel at the bottom of the ocean, and under the great pressure of the water would become fossiliferous, or petrified, and thus be preserved, just as some specimens you may see in our Museum have been preserved. Not only however would soil and plants be thus embedded but also the remains of some land animals—the deer or wolf, perhaps, from the interior, and some domestic animals. These also would be petrified and preserved. You may fancy what enormous periods must elapse before any great depths of deposits would thus be formed, and before the bed of the ocean opposite the river's mouth would be filled up. Perhaps only one or two feet in a century would thus be deposited. But time rolls on—the great upheaving power is at work elevating the bottom of the ocean, and at length a delta is formed—the land rises above the waves and a new tract of country is the result. Now a geologist, who would examine its beds, would be able to tell how it was formed,—to describe the plants and animals then existing on this island, though the species should have disappeared ; and he could also plainly make out that great periods of time elapsed during its formation. The sea-shells that had lived and died where they were embedded—the wolf and deer—perhaps the remains of a Red Indian or an Anglo-Saxon—all would tell their tale of the earth's history. And this is really a specimen of the way in which continents and islands have been formed ; and of the way in which the geologist reasons regarding them.

Thus, for example, the Nile has formed by its deposits the greater part of Lower Egypt. The Hoang Ho has extended the great plain of China, league after league,—and at the present moment the Yellow Sea is shoaling up—becoming shallower and shallower, and ere long promises to become a great plain of land. All rivers are performing the very same operations at their respective mouths. But when tracts of land are thus formed, the waters of the ocean are displaced and made to encroach upon low-lying lands and convert them into sea-bottoms. Every fresh creation of dry land involves a proportionate submersion of existing land, because the waters of the ocean are unchanged in bulk and must find a level. Thus large areas under the Pacific ocean are, it is known, undergoing the upheaving process—the coral reefs are raised,—new islands appear and existing ones are enlarged—a great continent will one day extend here and displace the waters of the ocean and throw them over our present lands. In this way it is conjectured by geologists that Europe and Asia may be converted into a number of islands—only their higher portions being able to keep above the waves—and the continents of America may be separated, and many of the lower portions—this island for instance,—which does not seem to possess any very great elevation—may become sea-bottoms. And thus the future inhabitants of the great South Sea continent, now in course of formation, may be sailing their ships over our hill and mountain tops and many of the present homes of civilization. Greater changes have already occurred. Where London and Paris now stand was once the bed of an immense lake, fed by streams flowing from the south (as the organic remains show) and forming the great bed of the London and Paris clay, and thus finally filling up the lake. St. George's Channel, across the bottom of which the electric wire is now laid, uniting England and France, was once a blooming valley, covered with willows and palm-trees, amid which the huge mastodon and other extinct elephant races browsed. The elevation of land elsewhere pushed the ocean into this valley—separated England and France—formed St. George's Channel and made Britain an isle of the ocean, and as a consequence, her inhabitants rulers of the waves. The great lakes of North America will one day be filled by their rivers—just as the one over which London and Paris are built—and future geologists will be exploring their organic remains and extinct races. Compared with these great changes what are the downfall of empires or the crash of thrones!

Now we have seen how bottoms of seas become elevated into continents and lofty mountain-chains—how the deltas of great rivers grow into the centres of tracts of dry land, and become the coal fields of new countries—how lakes are transformed into plains. We have got some faint idea of the great creative and destructive energies that are at work—but then, observe, every thing points to a slow and stately progression;—the changes are not violent, or fitful, but silent and continuous—the results are only visible after many thousand years have rolled past. These forces, during the six thousand years that man has been a denizen of earth, have been constantly acting, and the results as yet are inconsiderable. The shores of the Baltic we know are rising on the Scandinavian coasts at the rate of a few feet in a century—the shores of Europe are giving way a little before the sea—the deltas of the Mississippi and Ganges and other great rivers are rising; but, judging from what has already been done, many thousand years must elapse before any great changes will result. How vast therefore the periods that must have elapsed while similar processes deposited the foundations of our present continents at the bottom of ancient oceans, and finally raised the surfaces above the waves! This, then, is one of the first and most incontrovertible positions of geology—one of its primary lessons—that enormously long periods of time—millions on millions of years—were required for the formation of those great series of strata that lie piled, one on the other, in regular order, each having the remains of its own animal and vegetable productions firmly embedded. No man, who is qualified to weigh the evidence, can doubt that the changes which produced these effects were gradual and long continued. Fancy the time required to deposit beds ten thousand feet in thickness; and we find numbers of different series of such layers. Many rock formations are composed of the remains of animalculæ, which would require thousands or rather millions of years to accumulate these microscopic creatures in sufficient abundance. Tripoli stone, for instance, is formed of exquisite little shells, so minute and numberless that a cube of one-tenth of an inch is said to contain 500,000,000 of individuals. The chalk beds, which are thousands of feet in thickness, have accumulated from the remains of shellfish. There are shoals of shells, corals and fishes embedded in these strata, which must have required many centuries for the growth of the successive generations that are thus entombed. But even this evidence is not all—these petrified remains are found to be those of creatures that have now no existence on earth—the genera and species are different—they belonged to an animal creation that has passed away; so that we have incontrovertible proof that the earth has repeatedly changed its inhabitants. Only on approaching the surface do we find the remains of animals and plants such as now exist. Each series of layers is found to possess remains peculiar to itself—differing greatly from the others. How overpoweringly vast the periods during which all these myriads of creatures and all these races arose and ran their course on earth; and, as individuals and species, ceased to exist! In fact what geology demands is a period long enough to deposit ten miles of rocks, in perpendicular thickness, after the manner we have described. The strata so accumulated—having organic remains embedded throughout, are at least ten miles in thickness. More than thirty thousand different species of plants and animals have been found in these strata, nearly all of which are now extinct. This may help to give us some idea of the vast time occupied in forming the earth's crust. So long did each species occupy the earth that in many instances the quantities of their accumulated remains form lofty mountains. How utterly incredible, in the face of such facts, is the old theory, that six days of twenty-four hours sufficed for the formation of the earth, and that it is only six thousand years old!

With one or two reflections I would now close the present address. Looking back at the great revolutions through which our globe has passed,—the mighty cycles through which it has progressed, before reaching its present condition—the vast periods during which it was tenanted by no rational creature—and looking at that eternal law of change, which is working at this moment as intensely as during the past eternity—how vast and incomprehensible by us appear the majestic plans of the Almighty Creator—stretching as they do from everlasting to everlasting. How strange it looks, to our eye, that myriads of ages should be spent in those preliminary processes and preparatory steps, before earth was fitted for the residence of rational, immortal man:—and that our present continents and islands should be constructed from the wreck and ruin of other lands, and the remains of extinct races. We are startled at first by these strange revelations of geology;—at the vast changes requiring thousands of centuries to work them out;—at the circulation of matter brought to light, by which mountains are melted into the depths of the sea, and the "dark —unfathomed caves of ocean"—lifted into sunlight and transformed into waving forests, or rich green plains. We wonder why our earth resounded for so many ages with no cries but those of the brute creation—why so many races arose, lived their day and vanished:—why creation slowly followed creation—change succeeded change—wasting followed building!

"In that old eternal morning,
Worlds arose and worlds decayed,
God in beautiful adorning,
Smiled to see them bloom and fade."

"We may dream not of the glory
Of that earlier golden age,
It has left no mythic story,
Has inspired no prophet's page."

The reasons of the divine plan we cannot fathom. Enough for us that divine wisdom arranged all,—presided over all: and that each great creative and destructive process evinces the Infinite Mind. These former creations were laying the foundations of the present—preparing the way for what now is—fitting up a stately residence for a creature who was yet to be, and would be "made but a little lower than the angels"—storing up provisions for his wants deep in the bowels of the earth—preparing his coal and metals—"the chief things of the ancient mountains, and the precious things of the lasting hills,"—"the precious things of the earth and fullness thereof." These wondrous processes do really connect themselves with man—minister to his comfort—and aid his development as an intellectual being. A Father was making provision for his child, in the mighty cycles of the past. We are truly "the heirs of all the ages"—"in the foremost files of time." For us the earth's mighty furnaces have been flaming so many ages,—for us time's great anvil has been ringing during the periods of a past eternity! How little can we know of the future when the past is so mysterious! How little can we conjecture as to the issue of the divine scheme, of which we see perhaps but an insignificant fragment! But we may well conclude that this must be a majestic drama, of which the creation of man, and all pre-existent worlds is but the prologue;—that the mighty course of creation, of which a few introductory scenes are as yet alone transacted, will result in something worthy of Infinite Wisdom. Let us humbly trust and adore. Let us look forward to eternity as the period when we shall no longer "see through a glass darkly";—when the shadows shall flee and a fairer morning shine. Through all these mysteries man dimly discerns an all-wise purpose, and a father's hand;—and feels that the Infinite Love is guiding all well.

" Here sits he shaping wings to fly;
His heart forebodes a mystery;
He names the name Eternity.

" He seems to hear a heavenly friend;
And through thick veils to apprehend
A labour working to an end.

" To feel although no tongue can prove
That every cloud that spreads above,
And veileth love, itself is love."

LECTURE III.

The revelations of Geology, in reference to the past creative processes through which our earth has passed, and the immense periods during which it has been the scene of animated existence, are at once delightful and awe-inspiring. A new world, richer far than fabled El Dorado—full of more startling wonders than those with which imagination has peopled fairy realms—revealing forms of existence that once trod the earth, stranger far than ever rose in the wildest fancies of the poet, or lived in mythical tale, or fever-dream, is disclosed by this new science. We are led through the great catacombs, where are piled up, in order, the remains of those vast animal creations that preceded man in the chain of being; we walk through nature's awful charnel-house, where her children lie entombed in their stony shrouds;—and as we traverse these halls of death we read the inscriptions on the tombs, which afford us strange glimpses of the life and character of the creatures that here have sunk to their everlasting repose. Here are the records, engraven in imperishable characters on the rock, of those vast transactions that spread over thousands of centuries—of the slow and majestic growth and decline of ancient worlds—of the rise and fall of great ruling dynasties of animals that ran their course of many thousand years, and then gave place to higher existences,—of the forests and flowers that waved on the earth's surface, and faded to disclose yet fairer landscapes.

Geology deciphers the autobiography of these old worlds; for in the development of the eternal plan they have been made to record their own history. Not a stone or stratum but tells its wondrous tale. Throughout her great cycles of change nature is self-registering—acts as her own historian; and science interprets the page. Is there not something enrapturing in such studies as these,—something ennobling and elevating in the thought that you are reading pages written by the finger of God on stony tablets; and that these record his mighty workings during long-past ages. Here are the folds of that mighty web which has issued from "the roaring loom of time" where his hand works;—and we are reverently studying the ever-varying pattern in which the successive breadths have issued forth—

> "He weaves his web of many a star,
> Of tree, and beast, and bird,
> Of fish and insect; near and far
> His weaving may be heard.
> That great and loving spirit weaves
> His web of suns and spheres,
> Of winds and waves, and flowers and leaves,
> Of days, and months, and years."

And how enlarged are the views thus obtained of the Almighty Worker—how awful, yet enrapturing, the conceptions that arise in our minds of His wisdom, power, and goodness! These are only parts of his dread, majestic plan, that we behold—the accomplished portions of a divine purpose, which has already occupied æons of the past eternity, and the consummation of which will only appear after æons of the future eternity have rolled away. Every where we discover divine intelligence presiding—one great thought, as it were, pervading the whole majestic evolution—one great purpose ruling over the stately movements. At every step we meet with proofs of a divine plan. These vanished worlds are all linked with the present; and were but preparatory steps in the ways of the Infinite, for what we see around us. They afford us glimpses, dim and imperfect though they be, of that Infinite mind whose plans stretch from everlasting to everlasting.

I spoke in my last lecture of the slow method by which the earth has reached its present state—of the vast periods occupied in the formation of its different strata—and of the gradual way in which the bottoms of seas are filled up, and elevated into continents and mountain chains. Now it might seem beyond the possibility of conception, how the depths of the ocean, far away from land, where no deposits from rivers could reach, could ever be filled up. Take the vast basin of the Atlantic ocean—how could this huge chasm ever become filled up—or the portions distant from the shores ever be raised above the waves? In a work of great interest and ability, lately published by Lieutenant Maury, of the United States Navy, entitled "The Physical Geography of the Sea," I have met with a paragraph which furnishes a striking reply to this question. He informs us that a new sounding apparatus has recently been invented, by which specimens of the bottom of the ocean have been brought up from the depth of more than two miles. Most of you are aware that by means of deep sea soundings it has been ascertained that between Cape Race in this island, and Cape Clear in Ireland, a remarkable steppe or plateau runs, and that along this the sea is nowhere more than ten thousand feet deep. It is along this elevated sea-plain that it is in contemplation to lay down a sub-marine telegraphic wire, to connect the old world and the new. The great circle distance between the two shore lines is one thousand six hundred miles. We are all familiar with the idea of thus linking together Europe and America, and a few years will doubtless see it realized. Now it was when taking the soundings of this telegraphic plateau that the officers of the *Dolphin* employed the new sounding apparatus, and that its first trophies were brought up from the depth of two miles beneath the surface of the ocean. The substance brought up looked like clay, but upon examination by an eminent microscopist, it was found to be filled with microscopic shells, and that not a particle of sand or gravel existed in it, being mainly composed of silicious and calcareous shells. "It is not probable," says the scientific examiner, "that these animals lived at the depths where these shells are found; but I rather think that they inhabit the waters near the surface; and when they die their shells settle to the bottom." "Now," says Maury, commenting on this discovery—"these little mites of shells seem to form but a slender clew indeed by which the chambers of the deep are to be threaded, and the mysteries of the ocean revealed; yet the results are suggestive; in right hands and to right minds they are guides to both light and knowledge." The conclusion he draws from it is very beautiful and very extraordinary, and confirms most accurately the theory we have been discussing in regard to the formation of the earth's beds. The ocean, it is now proved, is teeming with life—every drop of water, examined by the microscope, has its myriads of inhabitants; and we know the vast numbers of fish that float in its waters. The smaller any creature is, the more numerous are the individuals, and consequently the greater the space occupied by their remains. The remains of all the coral insects, for example, require a far larger graveyard than the remains of all the elephant races that have ever existed. Now, whether the ocean is inhabited at great depths we cannot say—but its bosom, where light and heat are felt, must henceforth be regarded as a vast nursery of living creatures, whose remains sink to the bottom, and form there beds of vast depth. We had thought that the depths of the ocean were unaffected by any of those agencies that are wearing away all elevations of the land, and that in those quiet recesses no change could occur. "But," to use the language of Maury, "it now seems we forgot these oceans of animalculæ that make the surface of the sea sparkle and flow with life. They are secreting from its surface solid matter for the very purpose of filling up those cavities below. These little marine insects are building their habitations at the surface, and when they die, their remains, in vast multitudes, sink down and settle upon the bottom. They are the atoms of which mountains are formed—plains spread out. Our marl beds—the clay in our river bottoms, large portions of many of the great basins of the earth, are composed of the remains of just such little creatures as these, fished up from the depth of more than 12,000 feet (two miles) below the sea level." "These little shell-fish therefore when living may have been preparing the ingredients for the fruitful soil of a land that some earthquake or upheaval, in ages far away in the future, may be sent to cast up from the bottom of the sea for man's use. The study of these "sunless treasures," recovered, with so much ingenuity from the rich bottom of the sea, suggests new views concerning the physical economy of the ocean." This eloquent exposition needs no comment. Let us never pronounce any thing mean or useless in this great universe. These creatures, invisible to the naked eye, are laying the foundations of great continents and islands that one day shall rise above the Atlantic waves, and bloom in verdure, to become the homes of unborn generations.

> " Through the circles, high and holy
> Of an everlasting change,
> Now more swiftly, now more slowly
> Form must pass and function range,
> Nothing in the world can perish,
> Death is life and life is death,
> All we love and all we cherish
> Dies to breathe a nobler breath."

Having now got some idea of the way in which the earth's crust has been formed, and having grasped the first and fundamental principle of geology, that the very same agencies that are at work producing changes *now*, have produced all *past* changes, and that they are operating now as they have always operated—and consequently that their results are slowly and silently brought about,—we come now to inquire, in a cursory way, what are the contents and characteristics of those great deposits that lie beneath the surface of the earth. Our glance must be very general and brief—and without wearying you with scientific names, or encumbering you with lengthened details which the memory cannot retain, and which can only be mastered by lengthened and severe study, I shall aim at bringing the grand outlines and results before you—using as few geological terms as possible; and if you get hold of the leading principles, these will enable you to draw correct conclusions;—full details must be sought for in learned treatises on the subject by those who may wish to pursue the investigation.

It may seem to you an extraordinary statement that geologists are actually acquainted with ten miles, in perpendicular depth, of the earth's crust, or about the 800th part of its diameter, or 400th part of the distance from the surface to the centre. Of course no one has reached such a depth by perpendicular descent. No mine has ever been carried beyond half a mile beneath the surface—the loftiest peak of the Himalayas is little over five miles from the level of the sea. How, then, since we cannot dive far beneath the surface, or examine the ocean's bed, can we be said to know by ocular demonstration the thickness of ten miles of the external part of the earth? The reply is very simple—we cannot penetrate to the lowest beds, that were formed ten miles beneath the surface, but they are, in innumerable instances, brought up within our reach,—lifted up by the great upheaving force to the sunlight, and sometimes into mountain ranges. Indeed few if any of the strata that compose the crust of the earth, remain in the horizontal position in which they were originally placed. In the course of the great changes that have occurred, they have been dislocated,—forced up through the overlying beds and so displaced that their broken edges appear at the surface. Thus it happens that the lowest rocks, driven upward by the volcanic force from the interior, show themselves often at the surface over great districts of country; and by following these outcroppings, as the fractured edges are technically called, the geologist can make out, by careful comparison, the whole series, which, if placed perpendicularly, the one on the other, in the order of their formation, would extend ten miles below the surface. The different formations approach the surface, or rise into cliffs, hills or mountains, some in one place and some in another; the geologist traces them along sea-beaches, sides of valleys, river courses and mountains districts, and classifies and determines the character of the whole from the crystalline rocks up to the vegetable soil. Were it not for the disturbance of the strata by the upheaving force from beneath, and the elevation of the lowest beds that has occurred, we should know nothing of the earth's crust, and geology could have had no existence.

Of the nucleus, or skeleton frame of the earth that lies beneath these ten miles of crust, we know nothing, beyond the fact, now generally admitted, that it is in a state of fusion by heat, and consists, in all probability of an ocean of melted minerals, of which the boiling lava from the volcano's mouth is a specimen. We know however the rocks that rest upon this fused mass—the lowest of the series that extend to the surface.—These are named the primary rocks, as being the earliest formed; and present undeniable evidence of having been produced by the action of heat. Once they were, beyond question, molten masses, like glass in a furnace, as the fused materials in the interior still are; and by cooling and solidifying they crystallized into their present forms. They are unstratified—that is they give no evidence of having been deposited layer after layer, by water, as the others have been. The lowest of this class are the granite, trap and porphyry—the next gneiss, mica slate and clay slate—and the uppermost basalt. They are the hardest of all rocks. With the dark grey granite, used as steps at the entrance of some of our public buildings in this town, you are all familiar; and some of you may have seen specimens of the trap and porphyry or basalt. The estimated depth of these primary rocks is no less than 20,000 feet—nearly four miles. Now it is remarkable that no trace of animal or vegetable remains has been found in these rocks:—hence they are called *azoic*, or without life. When they were formed no organized existence could have been on the earth;—the mass of our globe was then all in a state of fusion by intense heat;—and the first cooling of the surface that took place, formed this immense floor of the earth, four miles in depth. The enormous internal heat has burst this covering and forced it up, in many places above the surface. Arthur's seat, close to Edinburgh, is a fragment of trap rock—the Giant's Causeway in Ireland, is composed of basaltic columns—even the Grampians, Pyrenees and Andes are believed to be solidified bubbles of the primitive liquid granite—thrown up by the awful force within, and congealed into their present form. The deep glens and rugged precipices that in many districts, delight us with their wildness and sublimity, have been formed by fissures and chasms in the formation of these primitive rocks.

The cooling process still going on, seas, though hot ones, could be formed,—these acted on the surface of the granite rocks,—broke them up and gradually deposited their worn fragments as sand or pebbles at the bottom of this primitive ocean. This was the commencement of a new series of formations, to which geologists have given the name of the secondary rocks. The lowest of this group is called the Cambrian and Silurian formations, and are many thousand yards in thickness, consisting of the water-worn particles of the primitive rocks, deposited in layers, and pressed into solid forms by the weight of the ocean. Here occurred the first creations of animal life—in the shape of shell-fish, such as corals; and their shells, agglutinated together, formed the first beds of limestone and marble that the world ever saw. Above the Silurian the Old Red Sandstone, rich in peculiar fishes and other fossils, occurs. Like the previous formation it was first the bed of an ocean, and then elevated into a tract of dry land. This ancient sea bed comes to the surface in various places, such as the north of Scotland and Ireland—and Herefordshire in England. A beautiful account of this great formation and the remains of the strange creatures it embeds, is to be found in Mr. Hugh Miller's book—entitled "The Old Red Sandstone." Above this system are found the Mountain Limestone and the great Coal formation. Vegetation was now rank and luxuriant—huge forests of pine sprang up, were finally submerged at the bottom of seas, and, by pressure and heat there, were petrified into coal beds, from which we now derive our fuel and gas, and are able to conduct our manufactures. I am reading this page by gas extracted from a tree that countless ages ago grew in a forest of the ancient world. Above the Coal is found the New Red Sandstone, the Oolitic formation, and, highest of the secondary series, the Cretaceous or Chalk beds, each having its peculiar animal and vegetable remains—each being first a sea bottom and then an elevated tract of dry land—which in its turn became again the bottom of an ocean.

The next great group of beds is named the tertiary formation, reaching from the uppermost of the secondary to the vegetable soil that now covers the surface. I shall not trouble you with the names of its various subdivisions. Its depth is about 2,000 feet, and its constituent elements chiefly sand, clay and lime. Their deposition must have occupied long ages—the course of their formation being marked by the slow excavation, by water, of deep valleys in rock marble,—by the return of a continent to the bosom of the ocean in which, ages before, it had been slowly formed, or by the departure of one world, and the appearance of another. During the tertiary formations the earth was approaching its present temperature—though it was still much hotter than now. Animals of a higher type than had yet been created then walked the earth—mammalians of enormous size, such as the mastodon, and dinotherium, browsed among the luxuriant forests. The animated forms were approaching towards the species that now exist, but were very different in shape, habits and size. In the uppermost beds of the tertiary formation, we find a number of the fossil remains of animals which still exist as species; but in the lowest beds, existing species rarely appear, and extinct races everywhere predominate. At length these huge monsters of mastodons all sank into their stony sepulchres,—the races disappeared—and a newer and higher existence, distinguished above them all by the glorious gifts of reason and immortality,—man primeval, for whom all these previous processes had been preparing the way, appeared on this platform of existence, surrounded by existing races, and was made lord of creation.

Look back now at the course we have been traversing—through ten miles of tertiary, secondary and primary formations,—from the dread gulf of fire below, where the granite ribs of the earth were cast, and its mighty, rock-framework molten in the awful furnace of the Omnipotent Creator,—from the world's foundations, to the thin seam of vegetable soil that now carpets the earth with its verdure, and furnishes sustenance for man and beast! How overpowering the contemplation of these world-ruins!—how vast the periods of time in which these giant races, uncouth monsters and mountain heaps of insects arose, decayed and vanished. The date of the pyramids, nay of man's creation, contrasted with theirs, is but an insignificant item of time. We know that during six thousand years only two or three species of animals have become extinct—have disappeared from earth; so vast is the term of existence assigned to each race;—then how enormous the time during which all these countless buried races completed their cycle of being in successive dynasties! Inch by inch—a few feet in a century perhaps,—these beds, some of them a mile and a half in thickness, has been deposited;—land and ocean have, by these slow processes, been made to change places again and again. Each group of beds has its own peculiar group of animal and vegetable remains—of creatures that have lived and died, as races of animals now live and die, and having occupied ages and series of ages, in their existence, just as living generations now are doing. The nicest order is observed in all these nice formations—the drawers of a cabinet of curiosities or of a museum are not more accurately ranged in order. The geologist knows where to look for any given species of animal or plant,—the mastodons have their beds—the saurians theirs. The order of the various strata is not violated. Should any fossil fragment be picked up the geologist will tell you to what group it belongs and where others similar may be found. This is the fundamental principle of the science—this enables us to classify, in beautiful order, the whole seemingly confused mass; and to discover the general law according to which all has been formed. All these are facts now as firmly established, and as indisputable, as that the earth revolves round the sun. No one duly qualified, who has examined the evidence with a mind open to truth, could resist the grand conclusions which we have been describing. That the earth has really passed through these changes of condition and of organic existences on its surface is as clearly proved as any of the great truths of astronomy which no man dreams of disputing. The result of the whole is to make it clear that the earth has slowly and gradually advanced from a condition unfitted for any animal existences to one in which man is denizen—and that, in all its intervening stages, it was inhabited by races fitted to its existing condition, —and that these have been continually rising in the scale of being,—from the shell-fish up to the quadruped, as the world was suited to higher and higher orders of existence. Thus there has been truly progress in the course of creation—not only in the condition of the earth, but also in the races of animals and vegetables that have been successively called forth by the creative fiat. Of this order of organic existences, I shall speak at greater length in another lecture. At present I shall only observe that, vast as is the earth's age, it is not eternal—all points to a beginning;—and in the face of eternity even the cycles of geology dwindle to insignificance. Every formation we have seen was derived from those that preceded it—every rock points to its source—we trace all successively to the granite,—a beginning was here. This granite is composed of three elementary substances out of the fifty-four which a distinguised philosopher has described as the alphabet composing the great volume which records the goodness and wisdom of the Creator. There is no chance here; —no fortuitous concourse of atoms;—law and consequently a lawgiver who designed the whole mighty evolutions are declared by every utterance of nature. If the mere discovery of these laws glorifies the human intellect then how great the Being whose infinite mind planned the whole, and whose providential care presides over every movement! We find ourselves, in tracing the growth and decay of worlds, and following the stupendous changes of the past, reading the energies of the Almighty Mind, and tracking the footprints of the Infinite One, who is above all time, and to whom the age of a world, or the existence of a race is but as the beat of the time-piece to ourselves—which falls on the ear and in a moment is past.

With a few reflections we close the present address. In following the discoveries of geology we find ourselves brought face to face with enormous lapses of time, and contemplating periods inconceivably vast, as chronicled in the stony volume beneath our feet. The thought arises with oppressive force—how insignificant is man—how brief his span of existence, when contrasted with the age of the globe—how inconsiderable his little day on earth measured by the course of a geological period! There is a little winged insect called the Ephemeron, that seems to be the shortest-lived of created beings;—in one short hour it dances out its existence in the sunbeam,—sixty successive minutes witness its birth; life and death! How insignificant its age compared with the duration of human life! How brief its glance at creation,—how little it can learn of the flowers, trees and vegetable growth among which it buzzes out its little hour of life! Of their growth and development it can know nothing. And are not we something like the Ephemeron—getting a hurried glimpse at the vast course of creation—seeing only a small fragment—a mere atom of the whole—viewing only an insignificant portion of the divine procedure which is from everlasting to everlasting. How little we can learn of the growth of a world—of a universe, during our short day on earth, or even during the life of humanity! We see it in one stage of its progress—or we look back and decipher past stages; but the great, unknown future lies beyond, and we cannot even conjecture what is to be. The present gives but faint intimations of what is coming. Had an angel visited this world during some of those ages that preceded man's appearance—when, for example, the saurian or elephant races were monarchs of earth, and no intelligent creature raised the eye of devotion or the accents of praise to the Creator;—and had he witnessed these animal forms devouring one another, or rejoicing in the vigour and gladness of existence—had he seen the huge forests and other vegetable growths that covered the globe, or the convulsions through which earth was passing, could he from these have conjectured the world of brightness and beauty that was to be, when man stepped on the scene;—could he when looking at the reptile tribes flapping their way through mud and water, and making the scene resound with their savage cries, have supposed that a time would come when heaven-gazing man would adorn a fair world by his labour, and cover it with cities, temples and palaces—bridge its oceans by his steamships—traverse the land in his fire-chariot and girdle the globe with his whispering wire? The lapse of myriads of ages was required to evolve these transformations. How little we can conjecture of the wonders yet to be, as time speeds onward on untiring pinion: and how poor seems our little life as it rises up in the all-encompassing eternity! And yet must not the being, for whom all the ages of the past have been working, be the possessor of a richly endowed nature and have a great destiny before him? Not without a purpose worthy of such a lengthened process, has God called man upon this platform of existence, and fitted up for him such a richly-stored mansion. Not in vain has he been made "a little lower than the angels"—endowed with faculties that enable him to comprehend in part the divine plan,—to read the mind of God in his works, and sympathise with the Father of Spirits. Great must be the destiny of a creature who thus so infinitely transcends all the former denizens of earth! Not in time, but in eternity is he designed to unfold his nature. And therefore, from amid the fogs of earth, and the darkness of his present lot he looks above; and anticipating dimly the greatness of his futurity, he gazes into the universe of awe and wonder overhead rolling on in its brightness and glory—its lamps the galaxies—its dome the immensities—and his spirit finds utterance in the poet's aspirations—

"Bright star of eve, that send'st thy softening ray
Through the dim twilight of this nether sky
I hail thy beam like rising of the day,
Hast thou a home for me when I shall die?

"Is there a spot within thy radiant sphere
Where love and faith and truth again may dwell?
Where I may seek the rest I find not here,
And clasp the cherished forms I loved so well?"

LECTURE IV.

When we look around us in this great universe, of which we are a part, it is wonderful to observe how all things are incessantly changing, and yet the system is upheld in perfect integrity. Every where there is motion,—on every hand we listen to the workings of the ponderous machinery,—tremendous forces are urging on the huge wheels in their endless revolutions,—we are in the heart of a huge manufactory, where the complicated movements and the countless processes going on, bewilder us; but there is no jarring of wheels—no collisions or convulsive movements; all works smoothly and majestically,—for the Infinite Mind constructed the whole, and presides over every department. Unending change is made to secure stability; perpetual mutation preserves a divine order. There is no destruction in the sense of annihilation,—new combinations come forth, beautiful and august, bloom for a time and pass away, to give place in nature's exhaustless creations, to fresh and yet lovelier forms. Kind nature takes all her offspring to her bosom, when their course is run; and even as the rose leaf flutters to the earth when summer is waning, so do they gently sink to rest in her great maternal arms. With cheering warmth and with a mother's smile, she welcomes the young generation, and tends them with undiminished affection and with all a parent's love. Her great maternal heart never grows cold—her great beneficent hand is never weary of giving. It is the smile of nature's God that brightens all—it is His heart of love from which all flows—his exhaustless bounty that never says "it is enough"; and nature's loveliness and beneficence, and all the gladsome life and happiness she cherishes in her bosom are the expression of the Infinite Love. Cradled in his paternal arms the vast universe of being and matter reposes safely.

> "Look on this beautiful world, and read the truth
> In her fair page; see every season brings
> New change to her, of everlasting youth;
> Still the green soil, with joyous living things
> Swarms, the wide air is full of joyous wings,
> And myriads still are happy in the sleep
> Of ocean's azure gulfs, and where he flings
> The restless surge. Eternal love doth keep
> In his complacent arms, the air, the earth, the deep."

If in the stillness of night, when every human sound is hushed, we should go forth and hold converse with nature, and if we were gifted with an ear supernaturally quickened to catch every sound that the midnight breeze wafts to us, what wondrous tones would float towards us;—what disclosures of nature's workings in her great laboratory where she silently elaborates the whole! We might hear the grinding of her great destructive machinery—the particles of the mountains and hills crumbling under its influence into the valleys, worn away by the air, the dew, the rain, the torrent or the avalanche;—the rivers hurrying on, freighted with land-spoils, to the ocean;—the leaves of flowers and plants fluttering to the ground—trees and forests sinking to the bosom of earth—the countless races of animals, on plain and mountain, in forest or ocean depths, sinking into the sleep of death. But other sounds might reach the ear,—at the bottom of the ocean the Great Architect is at work rearing the foundations of new continents—fashioning, by the strokes of His hammer, the corner-stones of unseen islands and mountain-chains;—no particle of matter is lost or wasted—the ruins of the old are the materials for the new. And over earth's wide expanse the seeds of new flowers and plants are bursting from the parent cell, floating in the air and shooting from the soil with fresh luxuriance; and among the animal tribes young life is ever coming forth, in robust vigour, to replace the decays of age and repair the ravages of death.

"I looked; aside the dust cloud rolled,
The waster seemed the builder too;
Upspringing from the ruins old
I saw the new.

"God works in all things,—all obey
The first propulsion from the night.
Ho! wake and watch, the world is gray
With morning light."

Geology reveals to us that this great wasting and building process has been going on during countless ages in the mighty past, just as it is proceeding to-night; and that whole worlds of organized existences, and of inorganic matter have again and again appeared and disappeared. All that now exists is constructed out of the ruins of the old; the ancient matter is but on another round of its majestic circulation—it is but the old tide pulsating to a fresh beat of nature's great heart. Life is the offspring of death:—

"Life that works and pauses never,
Death that passes into life,
Rest that passeth motion ever,
Peace that ever follows strife.

"From the dark and troubled surges
Of the roaring sea of time,
Evermore a world emerges
Solemn, beautiful, sublime.

"Evermore the worlds are fading,
Evermore the worlds will bloom,
To refute our weak upbraiding,
To throw brightness on the gloom.

"Ever the imperfect passes,
But the perfect ever grows ;
Forests sink to drear morasses
Fairer landscapes to disclose.

"All the beauty, all the splendour
Of the ancient earth and sky,
Graceful form and person tender,
All have passed in silence by.

"Man the fairest, man the youngest,
Man the darling of the gods,
With the weakest, with the strongest,
Travels to the still abodes."

One of the most startling discoveries of Geology is that the ancient worlds, on the wreck of which we stand, teemed with life ; and that from the moment when the first animal was called into existence till the present hour, the earth has never been wholly untenanted by animated creatures. From the first creation of living animal forms, till the production of those now in existence, an unbroken chain of animated beings extends—link succeeding link in regular order. The same is true of the vegetable creation ; since the first plant arose, till this hour, the earth has never been without its vegetable growth. To use scientific terms, which perhaps may occur at times unavoidably in the course of our enquiries, the earth has had its fauna, or animal races, and its flora, or vegetable races, ever since it became fit for their reception. In both these great departments our earth has changed its tenantry repeatedly. Species has succeeded species in the animal and vegetable kingdoms—each great formation having its peculiar remains ; and the farther we descend, in the earth's strata, the more widely do both fossil plants and animals, that is, the petrified remains of these, differ from those now in existence. Here a wide field of study opens before us—the whole vast animal and vegetable creations of the past, whose remains are beautifully preserved in nature's great museum—the flora and fauna now extinct, of the ancient worlds. It is a study, even in a few of its departments, sufficient to occupy a whole life time ; and many of the greatest minds of the day have devoted themselves to researches in its various branches. I propose to devote this lecture to a very brief exposition of some of the more important results that have been arrived at, and to an illustration of a few of the general principles that geology has here unfolded. Only an outline can be attempted.

The first thing that strikes us in examining the plants and animals of the ancient worlds is, that, though they are different from those now existing, they afford evidence of having been produced and nourished under the operation of the same laws as now prevail over the vegetable and animal worlds. They have all been constructed on the same general plan—all are parts of one great whole—of a beautiful cosmos—and all but different applications of the same divine idea. One Infinite Mind is thus proved to have fashioned the past and the present. Though countless species have disappeared, and have now no living representatives on earth, yet the principles of structure and details of organizations in these extinct species show them to have been parts of the same grand harmonious design from which the present races have originated. Thus, for example, we discover on examining the fossil remains of the old vegetable growths, that they derived their nourishment from the earth and air—had leaves, stem, flowers and fruit—that they struck their roots under the soil and reared their tops above—that the trees grew by depositing their sap, layer after layer, so as to form concentric rings, just as the trees now on earth grow—and therefore that moisture, sunshine and air were necessary to their growth. In size, appearance and kind they were different from the present, but in the grand outlines of their structure they were the same. When they grew the sun was darting his rays, the rain falling, and the laws of heat, gravity and electricity operating just as to-day. So, in like manner, the animal races of the past were constructed to breathe the air, to multiply their numbers, to devour one another, to assimilate their food, and move from place to place just as the animated tribes now are. The same great principles are observed in their formation and habits;—they therefore link themselves with those now walking the earth; they are but previous portions of the great chain—steps in the mighty plan. Hence we find that the great classes of animals and vegetables now in being have existed since life first appeared on our globe—that the classes of the old worlds are still in existence. Let us first consider the vegetable world. Naturalists have discovered, up till the present time, about a hundred thousand species of plants, now growing on the earth. These are divided into two great classes by a very decided characteristic; one class of plants have no distinct flowers and are named cryptogamian or flowerless plants—the others possess flowers, and are called phenogamian, or flowering plants. The flowering and flowerless plants, therefore, embrace all known species. There is another division almost as simple and amounting to the same thing—the seedless plants or acotyledons—the one lobed seed plants or monocotyledons, and the two lobed seed plants or dicotyledons. These divisions are very simple and easily remembered; and I have mentioned the scientific names because you will meet with these in almost every book on such subjects, and indeed in almost every publication you read. For popular use it is enough to bear in mind the flowering and flowerless—or the seedless and seed classes of plants, as the grand divisions. Now geologists find, in examining the plants of the ancient worlds, these great divisions in existence from the earliest periods. The lowest beds, in which vegetable remains occur, show both flowering and flowerless plants—or seedless, and one lobed and two lobed seed plants. Representatives of the three are found side by side in the earlier formations. So that the lowest, or seedless plants, in their humblest forms, such as sea weeds, did not come into existence first, and develope themselves into the more perfect seed plants; but both flowering and flowerless are found to have bloomed together from the first. But though this is true, yet an order and progression was observed in the previous creations. In the earlier formations it is found that the flowerless plants far exceed in number the flowering class—the lower, or seedless vegetables preponderate; and the more advanced, though then existing, are comparatively few in number. The difference, therefore, between the vegetable growths of the earlier formations, and those now in existence, was not, as some fanciful theorists would have it, that the humblest of the flowerless plants alone existed first, and were followed by the higher,—this is not the order of creation—but along with these simple forms, that then vastly preponderated, specimens of the higher flowering plants also existed. At present, in all countries the flowering plants far outnumber the flowerless—in the earlier periods the reverse was the case—the lowest infinitely outnumbered the higher. There has therefore really been progression—not that the lower developed themselves into the higher, but that the humbler races diminished gradually in numbers, and the nobler forms increased, age after age, so as at length to become the predominating classes. The order observed has been "from the primary prevalence of the rudimentary and simple, to the ultimate predominance of the more complex and perfect forms." But representatives of all the three great classes of plants existed in the first period as they do still. This is a law which has only been clearly brought out within the last few years, but it is now placed beyond a doubt. If we take the carboniferous series of formations which occurs very early, and among which the coral beds lie, we find the era to have been extremely rich in vegetable life. More than five hundred species of plants have been found in this group, and all the botanical families from the highest to the lowest have their representatives—from the fern to the pine and fir. Fossil trunks have been found measuring between sixty and seventy feet in length—and from two to five feet in diameter. These belonged to the highest developed family of the first order. The trees of these early forests bore luxuriant fruit, and the air was fragrant with flowers. In his "Footprints of the Creator" Hugh Miller has given us the figure of a fossil tree which he found in the lower Old Red Sandstone, and which has all the marks of being a dicotyledonous plant—or belonging to the highest order. In a beautiful paper read by the same author, at the last meeting of the British Association in Glasgow, on "the less known flora of Scotland," he refers to this venerable specimen of a tree which he struck from a Cromarty rock eighteen years ago, when labouring as a quarryman. He compares it to some araucanians of the warmer latitudes, and states, as additional evidence of its age, that he found close to it a fossil fish, peculiar to the Old Red Sandstone. The case therefore stands thus, according to Miller —"that in the oldest portion of the oldest terrestrial flora yet known, there occurs the fragment of a tree quite as high in the scale as the stately Norfolk pine or the noble cedar of Lebanon." Still it is clear the more perfect plants were few in the earliest periods—though the flowerless plants were just as perfect then as now. Of three hundred species, found in or beneath the carboniferous group, two-thirds are tree ferns or water plants: and of the whole secondary formation one-third are of a low type called cycadæ, which now do not constitute more than the two-thousandth part of our flora. The law therefore which these facts point to seems to be this—that when the earth was in a certain stage of its progress it was fitted to the lower order of plants, and these then flourished in abundance. The higher orders were introduced, and abounded only when the earth reached a more advanced stage so as to be fitted for their existence. There has therefore always been an exact adaptation of the vegetable growths to the condition of the globe.

The same law holds good precisely in regard to the animal races. The animals now living on earth, have been arranged into four great classes, and these like the great classes of plants, have always existed. The lowest class of animals is named radiata, because they are radiated or branched in structure, and often resemble plants;—hence, they are sometimes called zoophytes, or animal-plants. They exist in vast quantities in the ocean, and one class of them called the coral, builds up reefs thousands of miles in extent. The next class are the articulata—or animals having envelopes connected by annulated plates, or rings. The lobster, bloodsucker, spider, and insects generally, belong to this class. The third division is named the moluscous and includes all animals inhabiting shells. The grand and crowning division is the vertebrata or backboned animals —composed of four classes—fish, reptiles, birds, and mammalia or animals that suckle their young. At the head of the mammalia is man. Now on examining the petrified remains of the animal races the geologist finds that in all periods representations of these four great classes have existed. Thus, recent discoveries have made it certain that in the very lowest beds in which animal remains occur, the lower Silurian and Cambrian groups, fish of a high organization existed; and fish, as we have seen, belong to the highest or backboned class of animals. Thus for example a fish called the onchus has been found in the Bala Limestone, one of the Cambrian or lowest rocks in which remains have been discovered. The great naturalist Agassiz found on examination that the spine of this fish was more than twice as large as the spine of the dog-fish now found in our seas, or that even of the Port Jackson shark. It belonged to what is called the placoid order of fishes. Thus, at this early period true and noble vertebrata existed, of enormous proportions, armed with defensive spines five times as large as the dog-fish of the present era. The lower and simpler of each class of animals do not march first; but Adams of their race, perfect and admitting of no improvement, lead the way. These placoids of the Silurian and Cambrian beds belong to the most perfect type of their class. Thus the lower races did not first exist alone, and gradually develope themselves into the higher. But still there has been progression just as in the vegetable world. At first the earth was most favourable to the existence of the lower creatures,—the radiata, articulata and molluscs; and these, in the earliest periods quite preponderated; while the backboned animals were comparatively very few in number. Thus for a long period no backboned animals except fish were in existence—they were the solitary representative of their class—and at first were few in number. Then as the physical condition of the earth advanced reptiles appeared and became the preponderating race—marked a whole era and were monarchs of the scene—the lower orders becoming proportionately fewer. Then enormous birds appeared after a farther advance;—then mammiferous animals of vast size, as the earth became suited to their existence; and lastly man. The lower types were as perfect at first as they are to-day—the higher have become more and more complex. Thus then the order has been that the fish preceded the reptile—the reptile preceded the bird—the bird the mammal;—the varying condition of the earth receiving from the Creator's hand races adapted to the successive stages.

This is a very beautiful law—one that science has but lately succeeded in evolving after an examination of an immense array of facts. It completely destroys a very ingenious theory which was first propounded by a naturalist named Lamarck, and which was a few years since very eloquently expounded and ably defended in a fascinating volume which most of you have heard of or read, entitled "The Vestiges of the Natural History of Creation." The ability and ingenuity of the anonymous author gave wide currency to his views, but among those only who were but superficially acquainted with science. His theory, however plausible and captivating is now entirely exploded, as being utterly unsupported by facts. No one with any pretensions to science now holds the views announced in "The Vestiges of Creation." The replies of Whewell, Sedgwick and Miller—men of the highest scientific attainments—have shown the theory of creation contained in "The Vestiges" to have no better support than fancy. It would be foreign to the object I have in view, in these lectures, to enter on the discussion of this subject. To one part only of the development theory, as it is called, shall I for a moment refer. The author of "The Vestiges" holds that the higher forms of vegetables and animals have been developed, in a direct line, from the lowest;—that, for example, the humblest class of animals, the infusoria and others of the radiata, were transmuted or changed in the course of ages, into the next higher order—these again into a higher—and so on—till the mammalia were produced. Man himself on this theory is a development, through the inferior races of animals, from the microscopic infusoria. The theory is not atheistic, as some assert—it requires a Deity to endow matter originally with the wonderful powers of producing these developments—and then supposes it to obey the original law thus impressed upon it. Facts contradict this fanciful notion. Geology refutes it completely. If it were true the early fossils would be of a low type of organization—in the earliest strata mere embryos or fetuses would be found. We have seen that no such order is observed in nature. At the very bottom of the Old Red Sandstone, as we have seen, true wood has been found—and in the Cambrian Limestone of Bala a real vertebrated fish. In the lowest of the Red Sandstone, Miller has also discovered a fish named the asterolepis, of the ganoid class, which he describes most graphically in his "Footprints," and which he proves to have been a highly organized fish, nine or ten feet in length. The lowest order of fish therefore did not exist first, as the development theory asserts. Not only are true vertebrated fish found among the earliest fossils, but these are of the highest type of their class. In the forcible language of Miller—"the dynasty of the fish was succeeded by that of the reptile—the dynasty of the reptile was suceeeded by that of the mammiferous quadruped—and the dynasty of the mammiferous quadruped by that of man. We know further that the several dynasties were introduced, not in their lower but in their higher forms—that, in short, in the imposing programme of creation it was arranged as a general rule that in each of the great divisions of the procession, the magnates should walk first." Thus it appears that the development theory is left without any support from geology. Indeed the transmutation or change of one species into another is entirely without proof—no instance of it can be produced. Time produces changes, but it is by the extinction of one species and the creation of a different. If there be a law according to which new species are called into existence, and if second causes are employed in their production, no such discovery has yet been made; and as far as present knowledge goes we can only refer them to the fiat of the Creator. The most eminent naturalists and philosophers, such as Lyell, Professors Owen and Forbes, Agassiz, Sedgwick, Buckland and Miller,—all reject the development hypothesis. Thus true science has dispelled a dream of false science which if carried out would have ended in gross materialism, and placed man on a level with the beasts that perish.

I intended when commencing the composition of the present lecture to have directed your attention to some of the characteristics of the more extraordinary animal races that have lived in the old worlds and are now extinct; but I find myself so near the prescribed limits that only a very few sentences can be devoted to this topic. Let us glance first at the saurians, a tribe of enormous reptiles, that in the earlier epochs were the dominant races, and existed in enormous numbers. One of these named the ichthyosaurus, a specimen of which may be seen in the British Museum, "had the general contour of a dolphin, the head of a lizard, the teeth of a crocodile and the paddles of a whale. These paddles were each composed of more than a hundred bones; and the cavity of the eye was fourteen inches in diameter. It was a marine reptile of the average length of thirty feet." More remarkable even was the plesiosaurus. "It had the head of a lizard, the teeth of a crocodile, a neck of enormous length like the body of a serpent, the trunk and tail of a quadruped, the ribs of a chameleon and the extremities of a whale." "The iguanodon was a terrestrial reptile that once abounded in England—its dimensions were thirty feet long—fourteen feet in circumference of body, and a thigh six feet. What terror the appearance of such an enormous reptile would now create." The otterodactyle was another reptile having the head and neck of a bird—the body and tail of a quadruped, the wings of a bat and the teeth of a saurian reptile. With its wings it could fly or swim—it could walk on two feet or four—and with its claws it could climb or creep. It will occur to you that these saurians resembled the sea-serpent of whose appearance so many accounts have appeared of late years. The geologist knows that as a race the saurians are extinct and all lodged in their stony shrouds long ages before man's day on earth. The appearance of one of them in the shape of a sea-serpent can therefore only arise from a deception of the senses, aided by an excited imagination.

Long after the saurians had disappeared a race of gigantic mammalians entered on the scene. The dinotherium was a quadruped eighteen feet in length and of proportionate height, in shape resembling an elephant, but immensely larger, with enormous curved tusks reaching two or three feet below its lower jaw. The megatherium was twelve feet long and eight feet high, with a thigh bone three times thicker than that of the elephant, and a width of five feet across the haunches. The skeletons of these creatures together with a gigantic specimen of the mastodon are among the wonders of the British Museum. They all lived during the formation of the tertiary deposits; and must have existed in a climate more than tropical. The bones of some of them found in the northern parts of Europe indicate that a very different climate from the present prevailed there at one period.

We have now gone over the leading results of geology, and glanced at the grand outlines and conclusions of the science; and we are now prepared to compare the record written by the Divine hand in the stony leaves of nature's great volume, with the other volume which is also a Divine production, in order to see whether they harmonize in their statements. In next lecture I shall endeavour to prove that these discoveries of geology are in harmony with the account of creation contained in the book of Genesis.

LECTURE V.

I DOUBT not that many, who may for the first time hear of the conclusions reached by the modern science of geology, will be startled or even alarmed by these disclosures in reference to the history of the earth and its revolutions. And this alarm will, in most instances, arise from the circumstance that the declarations of the Bible on the same subject, as usually understood, do not seem to accord with the conclusions of geology; and thus in the minds of many sincere christians, a dread or jealousy of this science has sprung up, as though it were endeavouring to undermine the foundations of our faith, by shaking our confidence in the truths of the Bible. In such circumstances, the proper course for every honest mind, sincerely desirous of arriving at truth, is to give both sides a patient and dispassionate hearing. Let us put science to the bar, and candidly listen to a statement of her facts and deductions; and then turn to an examination of the scriptural record of creation, with a sincere desire in both cases to ascertain what is actually written, on the one hand, in the volume of nature, and on the other, in the volume of revelation. If we pursue this course we shall find that the two records are in beautiful harmony; and that the discoveries of all true science corroborate the utterances of the Bible. But in following this course it is essential that we keep our minds open for the reception of fresh truth, and be ready to welcome more light, from whatever quarter it comes. Let us bear in mind that both nature and revelation are great, deep volumes, and that their meaning, in many instances, can only be reached by patient, humble and laborious study. In both, much is plain, and much also profound and mysterious. Truth, in both, is reached by diligence and hard toil. It by no means follows that what lies on the surface, and strikes the eye of the casual observer, is, in either volume, absolute truth. We come to the interpretation of both, very often, with narrow and prejudiced views, and minds full of preconceived notions; and thus, both from nature and revelation, draw false conclusions. Hence there has been always in the world much false science and false theology. For long ages men misinterpreted the appearances of the starry vault, and arrived at the false conclusion that the earth was a flat plain, and that the heavenly luminaries revolved round it, in twenty-four hours. This was a false reading of nature's great book, which has been corrected by advancing knowledge; but while it formed the current belief, the Bible, by an equally false interpretation of its pages, was quoted in support of erroneous science. Now we are satisfied that neither the natural nor the revealed record teaches such a falsity; but we see from such an instance, that it is possible to misinterpret both volumes, and that increased light may bring about a truer interpretation. It becomes us, in such circumstances, to be ready to receive fresh accessions to our knowledge, and to modify our systems in accordance with ascertained truth. The case at present between geology and revelation, is precisely similar to that which formerly occurred between astronomy and theology. Owing to the want of any exact knowledge on the subject, the commonly entertained opinion regarding the earth, until within the last fifty years, was that six thousand years ago, at the Almighty fiat, the globe sprang into existence out of nothing; and that six days of twenty-four hours each, were occupied in arranging its present conditions. The Bible was believed to teach this theory; and is still so regarded by multitudes of sincere christians. Mean time geology, after more than half a century spent in investigating the structure of the earth, comes forward and proclaims the old belief utterly without foundation in fact, and declares the age of the earth to be immensely greater than hitherto supposed, and its formation to be the result of second causes operating slowly through immense periods of time. I have already presented you with an outline of the evidence on which these conclusions are based, and I trust, have been able to satisfy you that they are incontrovertible, because resting on the sure foundation of facts. The case therefore is just this—science has investigated successfully a new department of creation, and arrived at certain conclusions which must be admitted to be as well sustained as any other in the whole range of modern discovery. They are not theories, or mere guesses, but unassailable truths. Formerly erroneous conclusions were drawn from the facts of geology—fables regarding races of giants whose bones were supposed to be discovered in the rocks, and of monstrous forms of animals —"gorgons, and hydras and chimeras dire" were imagined to be found in stony tombs. Geology has dispersed these dreams, and read the record more correctly. The false rendering has given place to the true in science. And now it only remains that we enquire whether the interpretation hitherto generally put upon the opening portion of the book of Genesis, and which was believed to teach what is now known to be false science, may not be an erroneous reading of the volume of truth, having no foundation in the sacred record, but only in our own fallible judgments. Let us re-investigate the utterances of the Bible in regard to the history of creation, and fairly endeavour to ascertain its meaning,—not forcing it into accordance with a pre-conceived system; and we shall find, I believe, that we have hitherto been reading the divine record incorrectly—just as was done in former ages; and that its true interpretation is in entire accordance with the disclosures of science.

The first sublime utterance that meets the eye on turning to the first page of the sacred record is—"In the beginning God created the heavens and the earth." There can be very little controversy as to the meaning of this grand enunciation of the inspired writer. By the phrase "the heavens and the earth," if taken in its widest sense, as the connexion requires, we must understand the whole universe of dependent being. The Hebrew language has no more comprehensive expression for this idea. Taking it in this sense, we must attach to the term "created" its highest signification also—namely, to produce out of nothing. Thus the declaration of the passage is, that there was a time in the past eternity when, out of nothing, the material universe, or that portion of it which first had existence, was brought into being. This sublime utterance, therefore, stands by itself as an independent proposition, and forms a meet introduction to the great volume of revelation. It strikes at the root of all idolatry by publishing Jehovah as the originating cause of all things; it is a standing protest against the doctrine of the eternity of matter, and the idea of a chance-produced universe. It refers all to the wisdom and power of the Almighty Creator. But while it asserts this all-important truth—the foundation of all religion—it does not discover to us when, in the past eternity, the matter of the universe was first called into existence. The declaration is, that it took place "in the beginning",—a phrase sufficiently indefinite as to time, and which merely indicates the commencement of a series of events or a certain flow of duration that may be under consideration. *When* the first creative fiat went forth it was not the design of the record to inform us; but however distant we place it, beyond that epoch eternity's flow extends. Thus it is clear that the Bible does not assert any thing regarding the age of the earth—does not settle the date of its existence; it only declares that the world was made within the bounds of time, by the Omnipotent Creator—thus erecting a barrier against atheism, idolatry and materialism. Let the discoveries of geology, therefore, demand periods of duration for the formation of the various strata of enormous length, there is nothing in the sacred record to forbid such a supposition, or lead us to deny such a view if sustained by facts. The Bible is silent as to the period when the first creative energy went forth; and thus the freest scope is afforded for the researches of science in determining that which it did not fall within the sphere of revelation to unfold. Between the first creative act, described indefinitely as having been performed "in the beginning," and the first act of the first day's work, recorded in the second verse of the chapter, an interval of indefinite length may have occurred. Here is space enough for the successive creations of the geologist, however great his requirements in regard to time. He demands vast periods before man's day for his various formations; there is not the shadow of a denial in the inspired record. The Hebrew word translated "and," at the commencement of the second verse, is admitted by the best critics to be used frequently simply as expressive of the continuation of the narrative, but intimating nothing in reference to time, between two statements. Thus, then, a most important step is gained—a fair interpretation of the biblical record allows an indefinitely long interval after the first creative act; and this is all that geology demands. In this interval it may find space enough for the insertion of that great stony record it aims at deciphering. Fifty years ago, Dr. Chalmers, one of the first of modern divines, then a lecturer in St. Andrews', saw clearly this important truth, and announced that "the writings of Moses do not fix the antiquity of the globe;" and fourteen years after, in an article in the *Edinburgh Encyclopædia*, he declared that the same writings "left the antiquity of the globe a free subject for the speculations of philosophers." It is the same principle that, in the present day, after all the advances of geology, must be placed at the foundation of every scheme devised for harmonizing the conclusions of the science with revelation.

Now it is evident that one grand difficulty is thus completely and satisfactorily removed. By an erroneous interpretation, the Bible was represented as asserting that the material universe was no older than six thousand years—that it sprang into being only six days before man stepped on the scene. A more careful examination of the written record has shown that there is not the shadow of a foundation for such an exposition, and that the Bible does not reveal the earth's age. On this point, therefore, complete harmony between science and revelation is established; and were there nothing more in the sacred record regarding the history of creation, our work would be at an end. But the inspired writer proceeds, after the first sublime declaration, to detail the various creative operations that were carried on during six successive days; and it is regarding the work of these six days that the greatest diversity of opinion exists, and the chief difficulty is experienced. The question is, what creations are described by Moses—what elevations of land are referred to—and what orders of plants and animals are we to understand as having been called into existence? Where in the geological scale are we to find a place for the Mosaic creations of six days, and where are we to look for a confirmation or contradiction of the account in the book of nature? It is evident that these are questions of vast importance; for on the answer returned must depend the possibility of harmonizing Scripture and geology. Three leading theories have been propounded on this subject. The first is that developed by Dr Chalmers, about forty years since, and is still the most popular and generally relied upon. This theory holds that the Mosaic account of the six days of creation, has no reference to the long series of changes which took place previous to man's creation, or to the great chain of vegetable and animal existences that preceded those species now in existence. It teaches that the sacred writer was not instructed to make any declaration regarding the pre-existent worlds, whose remains we find embedded in the crust of the earth; but only in reference to the present condition of the earth, and the order of arrangements which commenced with man and the earth's present occupants. Thus this scheme supposes the pre-Adamite worlds to have appeared and sunk during long ages, as geology describes—that a period of destruction, death and darkness arrived over the whole globe—"chaos came again"—and then that creative power was again put forth, and the earth was, during six natural days of twenty-four hours, arranged as it now stands with its existing races of plants and animals. Of this creation alone does Moses speak. This theory was quite sufficient to meet all the difficulties of the case, when originally struck out, and for several years afterwards: but new discoveries in geology have shaken the foundation on which it rests, and it is now admitted to be no longer tenable. It rests upon the assumption that previous to the existing creation, a period of death occurred—and that all existent plants and animals were destroyed, and succeeded by a new creation. Here the recent discoveries of geology meet it with a flat contradiction. It is now ascertained that no chaotic gulf of death separated the existing creation from the past. Many species of animals and plants, now in existence, were so long ages before man's day on earth. "Instead of dating their beginning only a single natural day, or at most two natural days, in advance of man," says Miller in his Lecture before the Young Men's Christian Association of London, "they must have preceded him by many thousand years. The present creation was not cut off abruptly from the preceding one; on the contrary, it dovetailed into it at a thousand different points." "It is a great fact," he says, "now fully established in the course of geological discovery, that between the plants which in the present time cover the earth, and the animals which inhabit it, and the animals and plants of the later extinct creations, there occurs no break or blank, but that on the contrary, many of the existing organisms were contemporary, during the morning of their being, with many of the extinct ones during the evening of theirs." "And hence," he adds, "the scheme in question no longer meets the necessities of the case. Though perfectly adequate forty years ago, it has been greatly outgrown by the progress of geological discovery, and is no longer adequate."

Another scheme has been propounded, at a later date, by a writer of great worth and profound attainments—the late Dr. J. Pye Smith. He limits the Mosaic account of creation far more than that of Dr. Chalmers; for whereas the latter supposed it to refer to the existing creation over the whole earth, Dr. Smith restricts it to a small tract of country, somewhere in the interior of Asia, immediately around the spot where man was created. He supposes this tract to have been reduced to a state of darkness, and death, while outside it, light prevailed, and life went on as before; and that in six days of twenty-four hours this region was arranged and peopled with animal races and finally by man. Thus he makes both the chaos and creation limited and local. But though stated with all Dr. Smith's well-known power, and supported by able arguments, this scheme has never met with a general acceptation; and owing, I think, to the inherent improbability that appears on the face of it, and the forced and unnatural air it presents, it is generally felt that it fails altogether in bringing about the desired reconciliation, though it meets, in its own way, the difficulties that proved fatal to the theory of Dr. Chalmers. For these reasons I shall not occupy time in going over the serious objections that may be urged against it; but proceed to a brief statement of the third theory, which I believe to be in accordance with both physical and revealed truth.

This scheme, which was first enunciated by the illustrious Cuvier, and modified and expounded by Jameson, Parkinson and Silliman, has been recently brought forward with certain modifications, in accordance with late scientific discoveries, by the eminent geologist Hugh Miller, in the Lecture from which I have already quoted. In grandeur of conception—philosophic breadth of view and reverence for Scripture it seems to commend itself to both the divine and the philosopher; and though it may require some additional modifications, as knowledge advances, it appears to have grasped the great principle that must lie at the foundation of every scheme of reconciliation between the two records, and to have struck on the right path. Time will only permit a brief outline of this theory. It claims for the Mosaic history of creation a far wider range than that assigned it by either Chalmers or Smith—and supposes that in those few verses the sacred writer sketches a grand but simple and popular view of the whole course of creation, and embraces in his great sweep not only the present but all past creations, of which the geologist finds record in his tablets of stone. The grandeur of such a view at once strikes the attention; but the great matter is whether it is sustained by facts. It obtains the vast periods of time requisite, by understanding the six days of creation, not to be natural days of twenty-four hours, but six periods of indefinite length, corresponding, in duration, with those great epochs whose history geology fills up. During those six great periods, then, successive creations have been going on, in a certain order, which, in brief outline, the sacred historian describes. But then he does not evidently describe the various creations minutely or scientifically—that would have been to write a treatise on geology, and it is not in accordance with the Divine method to reveal scientific truth to man. It is clear he describes them as they appeared—as they would have presented themselves to a human eye, had it been gazing on the different scenes; so that it is not the actual but the visible we have in the Mosaic record—not physical but apparent truth. In fact we might say that here is a characterization, adapted to the capacity of ordinary men, of the great creative epochs of the past. In a few brief words it rapidly but correctly sketches the prominent features of each period. Just as we describe great historic, human periods by the most characteristic feature of each, so does the sacred writer fix on what is most prominent and distinguishing in each creative period, as it emerged and closed. Hence what we are to expect, in comparing the Mosaic record with the geological, is not a strict scientific correspondence but an agreement in the great general outlines.

Before proceeding to point out this correspondence I would venture to introduce an idea which has occurred to me as being of some importance, in connexion with this subject; and which seems to remove some difficulties. The question arises, why does Moses sketch the apparent and visible outline of each period, as it would have presented itself, in a miniature picture, to the eye of an observer? No human eye gazed upon those ancient worlds—no human historians were present to chronicle the great events; for man's day on earth had not commenced. The writer of the book of Genesis therefore could not have derived his knowledge from human records or observation; and yet he appears to describe the changes as though they had passed before his vision. It seems to me a fair and obvious inference from this, that when God was pleased to impart a revelation on this subject, to his servent Moses, he did so in the form of a vision; and that thus there passed before his mind's eye successive pictures of the great creative epochs of the past. This was one of the most usual modes in which God communicated with the ancient prophets, and imparted truths to their minds. And if we suppose that in enlightening the mind of Moses, a grand panoramic view of the whole past creative processes, moved, as it were, before his eye, and was thus imprinted on his imagination; and that Moses describes this seer-vision of the past, as it flitted before his gaze, we obtain a clearer insight into his history, and a more satisfactory idea of the revelation and its import. Thus we may suppose that a characteristic outline of each period presented itself to his mental vision, containing what was most striking and prominent in each; and each, as it rose before him, brightened as the dawn of morning, and at its close darkened like the evening twilight; so that the seer correctly described each of the six as a day—each having a morning dawn and an evening decline to his prophetic gaze. The divinely impressed vision corresponded to actual facts, in its great outlines, and was fitted and designed to impart truth; but then like all prophetic visions it was shrouded in mystery, so that, in all probability he who looked upon it, could only partly, or perhaps very imperfectly if at all, conjecture its full import. Moses describes the vision of creation that presented itself; but we have no reason whatever to suppose, that it conveyed to his mind those great facts which geology has unfolded, or that he was inspired so as to be acquainted with all the changes which the earth had undergone, in the mighty ages of the past. Just as the prophet had to search into the meaning of his own vision, and his own words, and often understood them imperfectly or not at all; so it may have been with Moses, as he gazed on the great vision of creation, whose outline he has painted in words. In majestic grandeur it flitted before him—but it did not seem good to the Creator to make his servant acquainted with its mystic import, except so far as moral ends were concerned. The intellect of man was made equal to the task of reading the earth's history, and revelation was not required. But then, just as in other prophetic visions, the event when it arrived, was found in beautiful correspondence and harmony with the vision, so now that science has unfolded the history of creation it is found in strikingly beautiful accordance with the vision that moved before the mind of Moses. The picture and the reality, when confronted, are found to correspond. And thus we obtain the most powerful testimony to the inspiration of the Mosaic history—geology willingly bearing witness. At the same time we see abundant reason for the sacred writer speaking of "morning and evening," in describing his vision—and we are saved from all necessity of supposing Moses to have been gifted by inspiration with a complete knowledge of the whole circle of geological discovery—a supposition which has made many turn away from all former theories of reconciling the records, because of its extravagance and utter improbability. For these and other reasons which I cannot now enumerate, the theory I have explained seems to meet the whole case most completely, and to remove all apparent difficulties; while it appears far more reasonable and consistent than that which supposes the account to have been dictated by the spirit of inspiration in verbal form.

Let us now turn and enquire whether, taking the six days of creation as lengthened periods, we find a correspondence between the history of creation contained in the first chapter of Genesis, and that written in the rocks. This has been so clearly and ably brought out by Miller, that I cannot do better than present you with a brief abstract of his views. He states that it is only of three out of the six days' creative operations that any record could be found in the rocks. On the first day light was created,—on the second the firmament was made to separate the waters from the waters,—and on the fourth the two great lights, and the heavenly bodies became visible from the earth's surface. Of these operations no traces could appear on the stony tablets which the geologist reads. Thus it is only the remaining three in which a correspondence can exist—namely, the operations of the third period, in which plants were created—the fifth period marked by great sea monsters and creeping things,—and the sixth distinguished by cattle and beasts of the earth. Now, says Miller, "all geologists agree in holding that the vast geological scale naturally divides into three great parts. There are many lesser divisions—divisions into systems, formations, deposits, beds, strata; but the master divisions, in each of which we find a type of life so unlike that of the others, that even the unpractised eye can detect the difference, are simply three—the Palaeozoic, or oldest fossiliferous division—the secondary or middle fossiliferous division,—and the tertiary or latest fossiliferous division." He then goes on to state that though there were animals, such as corals, fishes, and even reptiles, in the first of these divisions, these did not give its leading character to the period, or form its most remarkable feature. But what chiefly distinguished the Palaeozoic from the secondary and tertiary was its gorgeous flora. It was emphatically the period of plants—"of herbs yielding seed after their kind." "In no other age did the world ever witness such a flora. Wherever dry land, or shallow lake, or running stream appeared, from where Melville Island now spreads out its ice-wastes, under the star of the pole, to where the arid plains of Australia lie solitary beneath the bright cross of the south, a rank and luxurious herbage covered every foot breadth of the dark and steaming soil; and even to distant planets our earth must have shone, through the enveloping cloud, with a green and delicate ray." Of this extraordinary age of plants our immense coal fields are the petrified remains. Here then, according to Miller, we have the record of the third period of creation, of which, when it passed before his vision, Moses, describing it by its most prominent feature, said, "the earth brought forth grass, and herb yielding seed after his kind, whose seed is in itself upon the earth." The correspondence is at once accurate and remarkably impressive.

Passing now to the secondary period, it had its plants, but they were greatly less luxuriant than the former; and its grand distinguishing existences were "its huge creeping things—its enormous monsters of the deep, and, as shown by the impression of their foot prints stamped upon the rocks, its gigantic birds. Its wonderful whales, not however, as now of the mammalian but of the reptilian class—ichthyosaurs, plesiosaurs, and cetiosaurs must have tempested the deep; its creeping lizards and crocodiles, some of which more than rivalled the existing elephant in height, and greatly more tnan rivalled him in bulk, must have crowded the plains or haunted by myriads the rivers of the period. We are thus prepared to demonstrate that the second period of the geologist was peculiarly and characteristically a period of whale-like reptiles of the land, and of numerous birds—some of them of gigantic size;—and in meet accordance with the fact, we find that the second Mosaic period—or fifth day's operations—was a period in which God created the fowl that flieth above the earth, with moving or creeping things, both in the waters and on the land, and what our translation renders great whales, but what I find rendered in the margin great sea monsters."

The tertiary or third period was not remarkable for its flora, or reptiles; "but its beasts of the field were by far the most wonderfully developed, both in size and numbers, that ever appeared upon the earth. Its mammoths and its mastodons, its rhinoceri and its hippopotami, its enormous dinotherium and colossal megatherium, greatly more than equalled in bulk the hugest mammals of the present time, and vastly exceeded them in number. How accurately and strikingly does Moses describe his vision of this period! And God said let the earth bring forth the living creature after his kind, cattle, and creeping thing, and beast of the earth, after his kind, and it was so."

"Thus," Miller adds, "if taking the Mosaic days as equivalent to lengthened periods, we hold that in giving their brief history, the inspired writer seized on but those salient points that would have arrested most powerfully, during those periods, a human eye, we shall find the testimony of the two records complete. And it is surely worthy of remark, that while in both the sacred and geologic records a strongly defined line separates between the period of plants, and the succeeding period of reptiles; and again between the period of reptiles and the succeeding period of mammals, no line in either record, separates between this period of mammals and the human period. Man came into being as the last born of creation, just ere the close of the sixth day—the third and terminal period of organic creation—to which the grand mammals belong."

A word or two in conclusion, on two points: First, in reference to the propriety of regarding the word "day" in the first chapter of Genesis, not as signifying a natural day of twenty-four hours, but a large period. This does no violence to the genius of the Hebrew language. The best critics admit both renderings. Besides there is unmistakable intimation in the first chapter of Genesis itself that the word "day" is there used in the sense of an extended period. The measure of a natural day is the revolution of the earth on its axis, before an *illuminated* sun: but this standard was not established till the fourth day, or period; consequently the three preceding days could not have been natural days, in the ordinary sense. In the fourth verse of the second chapter of Genesis, we read, "these are the generations of the heavens and the earth in *the day* that the Lord God made the earth and the heavens." Here the whole six creative periods are called "*a day*,"—that is, not one of twenty-four hours, but a *period*;—a conclusive intimation of the sense in which it is to be understood in the Mosaic account of creation. The word is used in the same sense in other parts of scripture. In Job, 14th ch., 6th verse, it is said, "turn from him that he may rest, till he shall accomplish as an hireling his *day*,"—that is, the period of his existence on earth. These examples then will suffice to prove that in understanding the word day in the first chapter of Genesis as a period, we are not violating the ordinary usage of the Hebrew language.

The second point is the Sabbath:—what are we to make of the reason for its institution, on the interpretation we have adopted? On this point I would quote the words of Miller, which seem to me to remove all difficulty. He says, "God the Creator, who wrought during six periods, rested during the seventh period; and as we have no evidence whatever that he recommenced his work of creation—as, on the contrary man seems to be the last formed of creatures—God may be resting still. The presumption is strong that his Sabbath is an extended period, not a natural day, and that the work of redemption is his Sabbath-day's work. And so I cannot see that it in the least interferes with the integrity of the reason rendered, to read it as follows:—Work during six periods and rest on the seventh; for in six periods the Lord created the heavens and the earth, and on the seventh period he rested. The divine periods may have been very great, the human periods very small; just as a vast continent or the huge earth itself is very great, and a map or geographical globe very small; but if in the map or globe the proportion be faithfully maintained; and the scale, though a minute one, be true in all its parts and applications, we pronounce the map or the globe, notwithstanding the smallness of the size, a faithful copy." He adds,—"God's seventh day's work is the work of redemption. And, read in this light, his reason vouchsafed to man for the institution of the Sabbath, is found to yield a meaning of peculiar breadth and emphasis. God, it seems to say, rests on *his* Sabbath from his creative labours; in order that by his Sabbath-day's work he may save and elevate you; rest ye also, on your Sabbaths, that through your co-operation with him, in this great work, ye may be elevated and saved. Made in the image of God, let God be your pattern and example. Engaged in your material and temporal employments, labour in the proportions in which he laboured; but in order that you may enjoy an eternal future with him, rest also in the proportions in which he rests."

LECTURE VI.

THERE is a short but exceedingly beautiful poem, by the American poet Bryant, called "Thanatopsis," in which an attempt is made to embody the teachings of nature, in reference to that mysterious law under which every thing that lives is placed—the great law of death. When dark and oppressive thoughts of the last "stern agony," and the "narrow house," "make us to shudder and grow sick at heart," the poet would have us to go forth and hear that still, clear voice that rises from ocean, earth and air, revealing something to man, though in deep, mystic tones, of the meaning of this great, God-created universe, and of his own mysterious destiny. Brightly the morning sun flings his glorious rays over his encircling worlds,—brilliantly the glittering stars shine down upon us from their serene heights,—like electric lights placed by the Creator's hand to illuminate the fathomless gulfs of space;—gloriously the cloud-capped mountains lift their heads to heaven, and fling their giant shadows over the green vales. And joyously life bursts forth in its myriad forms, drinking in enjoyment and happiness at every pore,—leaping and disporting itself in the vigour of youth. How glad are the animated creatures of earth! How joyously the lark mounts upward to the cloud, "and singing still doth soar, and soaring ever singeth!" How playful the lamb over the flowery mead! How sweet the song of birds—the rushing of the health-giving breeze of morning—the joyous shouts of childhood at its sports! Is it not a happy world? But then rises up within us the saddening thought—all these must die; a few short years, and all that is now so bright and beautiful and happy, will be mouldering in the dust. Decay and death are stamped upon all, and all are on their march to the tomb. Even as we gaze the havoc of death goes on,—the lion leaps upon his shrieking prey,—the lark drops lifeless from his canopy of cloud,—the mother in agony hangs over the couch of her expiring child, and slakes his death-thirst. Death is shouldering life in every corner of creation, and the world is but their battle-ground. This earth that looks so beautiful, is a great charnel house, full of heaped up bones, and once animated dust. Its very rocks are tomb-stones inscribed with countless "in memoriams" of the forms they lock in their cold embrace. Its mountains are the piled up remains of creatures that once disported themselves in the sunbeams, and are now reduced to dust. Not a pebble you can pick up but is the sepulchre of thousands of once living creatures—not a particle of dust but has been many times alive. How strange that all things live only to die; and, strangest of all—man, with his soaring genius, and heaven searching eye, and intellect that scans and comprehends the eternal plan—man, who has weighed the earth, and tracked the comet in its flaming course, and interpreted the starry scriptures of the skies—man too is under the great law of death! In the words of the poet,—

> "Earth, that nourished thee, shall claim
> Thy growth, to be resolved to earth again,
> To mix forever with the elements,
> To be a brother to the insensible rock,
> And to the sluggish clod which the rude swain
> Turns with his share and treads upon. The Oak
> Shall send his roots abroad and pierce thy mould."

The view seems dark and depressing enough. Man, who in reason is so godlike, is, with the insect of an hour, travelling to the still realms of death! What says nature to this mystery of mysteries? What word of consolation has she for man, her doomed favourite? Thus the poet interprets her whisperings,—

> "Yet not to thine eternal resting place
> Shalt thou retire alone—nor couldst thou wish
> Couch more magnificent. Thou shalt lie down
> With patriarchs of the infant world—with Kings,
> The powerful of the earth—the wise, the good,
> Fair forms and hoary seers of ages past,
> All in one mighty sepulchre. The hills
> Rock-ribbed and ancient as the sun; the vales
> Stretching in pensive quietness between:
> The venerable woods—rivers that move
> In majesty; and the complaining brooks
> That make the meadows green; and poured round all
> Old ocean's gray and melancholy waste,—
> Are but the solemn decorations all
> Of the great tomb of man. The golden sun,
> The planets, all the infinite host of heaven,
> Are shining on the sad abodes of death,
> Through the still lapse of ages. All that tread
> The globe are but a handful to the tribes
> That slumber in its bosom. Take the wings
> Of morning—and the Barcan desert pierce,
> Or loose thyself in the continuous woods
> Where rolls the Oregon and hears no sound,
> Save his own dashings—yet—the dead are there;
> And millions in those solitudes, since first
> The flight of years began, have laid them down
> In their last sleep,—the dead reign there alone.
> So shalt thou rest." * * * "All that breathe
> Shall have thy destiny."

Admitting the beauty and grandeur of this poetical strain, still the mystery is no nearer a solution—still the enquiry presses upon us, wherefore should all living things receive their existence, and possess their tenure of being under the universal law of death? Still more—why should that death, under which all must pass, be accompanied with circumstances of pain, and often terror. There may be something consolatory in the thought that our great mother earth clasps us all to her bosom at last,—and that our great sepulchre is so richly garnished—gilded over with flashing sunbeams—lighted up with the far off galaxies—carpeted with green, and clad with the gaily tinted flowers. The poet may well say, "thou couldst not wish couch more magnificent." But why must all these glories and beauties cover a tomb and garnish a grave—why are they all cypress-wreathes decking out a corpse, and hiding the deformities of death? We might reconcile ourselves to the idea of flowers and animals passing away, generation after generation; but why must intellectual man, with his deep longings after immortality, his imagination that ranges the universe, his great heart of love that clings so fondly to home and kindred—why must he enter the gloomy halls of death, and lie down side by side with the saurian and ephemeron? We need not hope to solve such mysteries in the present stage of being;—only by entering "the dark valley" will its meaning be unfolded;—only in a future world of clearer vision, will the mystery of death be explained fully. Still, like most other mysteries, we are permitted to know it in part here; and from the light cast on it both by science and revelation, we have sufficient assurance that one day this dark shadow on our world will be seen to have bright sunshine behind it; and this cloud, like all others, to float only near the earth, and to rise from its vapours, while the serene azure depths are far above.

"Wise and noble is the feeling,
   And the thought should make you strong,
That no ill of God's revealing
   Can be altogether wrong.

"Through the spheres and through the ages
   Flows a compensating law,
If you search the starry pages
   You will find a grace in awe."

There is one theory regarding the universal law of death, which I believe is still the most generally accepted, as being taught in the Bible, and which I now propose briefly to examine. I refer to the opinion that the introduction of death into this platform of existence, and its effects not only upon man, but also the inferior animals, have been owing to man's transgression. Previous to man's apostacy, it is supposed by many that death was unknown, and had he remained innocent would be still unknown in the world; and that in consequence of human sin, the plants and animals that before were immortal, were brought under the operation of the law of death, as a primitive arrangement. It seems to me that this doctrine, so far as it connects the inferior animal races and the plants with man's sin, and involves them in man's punishment, must have been adopted from some very loose and imaginative interpretation of scripture, taken up without much reflection; for it is impossible to find any passage in the Bible that teaches us to believe that death came upon the irrational and vegetable creations because of man's fall. Read the account in Genesis of the human fall from innocence and obedience, and you find no hint there that some vast change passed over the creation when Adam fell—no description of animals suddenly becoming ferocious, and preying on one another, while previously they were mild and harmless, and fed only on vegetables. It is probable, indeed, that Milton's great Epic—Paradise Lost,—with its majestic verse, and noble figurative garb, has had most influence in giving currency to the theory in question. Not that our great poet, with his lofty philosophic genius, really held such views or meant to teach them; but his bold figures were hardened into facts by dull prosaic minds; and his lofty images, in this as in many other things, instead of being taken as they were meant—a poetic bodying forth of the spiritual and invisible—were understood as realities, by unpoetic souls. Hence, when he spoke of

> "Man's first disobedience and the fruit
> Of that forbidden tree whose mortal taste
> Brought death into the world, and all our woes,"

his language was interpreted literally and without limitation. And when he said, in describing the effects of the fall upon the lower orders of creation, that

> "Discord first
> Daughter of sin, among the irrational,
> Death introduced:—through fierce antipathy
> Beast now with beast 'gan war, and fowl with fowl,
> And fish with fish: to graze the herb all leaving,
> Devoured each other."

This fine poetic fancy was transformed into a scientific fact; and men believed as a reality, what to Milton's great mind was but a noble phrenzy of imagination. Thus the notion may have gained acceptance. Let us see whether it rests upon any solid foundation, either in science or revelation. And first, let us enquire what science teaches in regard to this great law of death.

Nothing can be more clear and emphatic than the decision of geology as to the fact of death having been in the world, long ages before man's creation,—indeed, from the very time that life, in its humblest form, commenced. We have seen, in former lectures, that, with the exception of the primary, or unstratified rocks, which gave evidence of having been formed by the action of intense heat, and cooled from a molten condition, even the earliest formations abound with animal and vegetable remains. Here are found, in countless multitudes, the petrified forms of creatures that, in the gray dawn of time, ran their term of existence, and found a rocky tomb, where they have rested till the present hour. And here too, in myriads, are the ruins of mighty forests, and of gorgeous flora after flora, that bloomed and died on the bosoms of these ancient worlds. Such remains, in fact, are found to constitute the principal, and sometimes almost the entire substance of different beds, that are hundreds and thousands of feet in thickness, and many square miles in extent. Rocks of enormous thickness, when examined by the microscope, are found to consist entirely of beautiful shells, invisible to the naked eye, and which were once the residence of living creatures. Several of the pyramids of Egypt are built of a kind of limestone composed of microscopic shells of extraordinary beauty. So minute are these shells that in a kind of polishing stone called Tripoli, because first found at Tripoli, in Africa, a cube one tenth of an inch is calculated to contain five hundred millions of individuals. The immense chalk beds that come near the surface in various places, are the catacombs of countless myriads of once-living forms. Add to these the remains of those giants of the old worlds,—the sea-dragons, or huge saurians, of which I spoke on a previous occasion—that dragged along their slow length of 40 or 60 feet—and the great mammals, whose bones are shown in our museums and strike the beholder with amazement—the dinotheriums and mastodons of the tertiary period; and do we not see, on looking at facts like these, that much of the earth's crust is actually composed of the piled up dead bodies of the animal races that have lived and died during the great revolutions of the globe, and of the vegetable remains that era after era grew to die. That these races of animals and plants preceded man is satisfactorily proved by the circumstance that no remains of man or of his works have ever been found mingled with them. Had man been in existence when these creatures lived and died, beyond all doubt his petrified remains would be found mingled with theirs; but no trace of man is discovered till we reach the very highest stratum. Man is, therefore, comparatively of recent origin. Indeed such was the condition of the globe during the earlier epochs when these animals existed, that such a creature as man could not have lived on earth. A fierce heat—far more than tropical—raged; and the air, judging by the rank vegetation that prevailed, must have been loaded with carbonic acid and other poisonous gases. These entombed animals, therefore, must have preceded man; and if so, death has been at work since the first microscopic insect appeared, and the first vegetable took root in the earth.

There is another important consideration. We know that at present a very large proportion of the animal creation is formed expressly to live by devouring the bodies of other animals; and these carniverous races are provided with organs fitted for pursuing, seizing, killing and swallowing those creatures that are their prey. Now the geologist finds the remains of similar carniverous classes in all the various formations; so that they must have existed from the first, and been inflicting painful death from the very beginning. Not only does their structure and powerful teeth indicate what were their habits, and prove that they could only have lived by eating the bodies of others; but as if to put the matter beyond a doubt, one animal is often found enclosed in the body of another, by whom it had been devoured as food—and beneath the ribs their stomachs are found replenished with chewed pieces of bone, fish-scales, and other remains of animal food. Can we doubt after this that death was in the world long before Adam tasted the fatal fruit?

Still farther, the very constitution of both plants and animals shows that death must have been a part of the present system of things, as it came from the Creator's hand. The plan on which plants and animals are constructed, renders death, or something equivalent to death, absolutely necessary. Plants derive their nourishment from dead inorganic matter—but animals can only be sustained on something that has had life—that is, either on vegetable or animal food. Thus, constituted as things are, life is only possible where death is operating. That animals may live at all there must be death—the death of plants and of other animals. Even in the case of animals that live exclusively on vegetable food, every leaf or root, or fruit they eat, contains multitudes of living forms, most exquisitely organized, that are thus inevitably put to death by graminivorous creatures, in the very act of swallowing their food. The carnivorous animals, again, could not live on vegetable food—their digestive apparatus, muscular system, and teeth, being only fitted for destroying and digesting other animals. The structure of every animal determines its food, and hence, from these fossil remains, we can determine the habits of the pre-adamite creatures; and we find their constitution to have been the same as that of existing carnivorous races. The general plan we find to have been the same through all the great creative epochs of the past. In fact the evidence is irresistible that from the beginning it was intended that one generation of plants and animals should be removed by death in order to supply nourishment and make room for their successors.—The All-Wise Creator designed that life and death should minister to one another throughout the whole extent of the animal tribes. The very constitution of the universe implies this. Production and re-production, where the space is limited, require removal of race after race; for only thus could life go on. Death, therefore, among the inferior races, is no accident,—but inherent in the constitution of things, and operating from the beginning. A limited space could not accommodate an indefinite number.

Having ascertained these facts let us now turn to a consideration of the inspired record on this point. The question is, does the Bible teach that death had no place in the world before man sinned; and that it has fallen upon the inferior creation in consequence of man's apostacy?—

Those who hold that such is the doctrine of scripture point to two passages in support of their view. The first is the well known passage in Romans, " By one man sin entered into the world, and death by sin: and so death passed upon all men, for that all have sinned." It is perfectly clear from this passage, as well as many others, that death has been introduced among *the human race* by sin: and that had there been no disobedience on the part of man, there would have been nothing in the shape of what we name death among the human species. Death therefore has come upon man as the penalty of sin. This is a clear doctrine of revelation. But then the passage which teaches this, most carefully limits the connexion between sin and death to man, and thus by implication excludes the irrational creatures which are incapable of sinning. " By one man sin entered into the world, and death by sin,"—these seem explicit terms, and of wide import ;—but then mark how the concluding part of the sentence fixes the Apostle's meaning, and limits his language to man—" and so death passed upon all "—not all animals—all living creatures, as it would have been expressed, had he intended to teach such a doctrine—but " so death passed upon all *men*, for that all have sinned." Here it is plain that as the sin was man's, the penalty too was his. No allusion is made to the irrational creatures that cannot sin; and no assertion is made implying that they were rendered mortal by man's sin.

The other passage relied upon is precisely similar, and occurs in 1 Cor. xv. 2, " Since by man came death, by man came also the resurrection from the dead." The latter part of the sentence limits the reference to the human family. By man's sin came death upon his race—and by the God-man, Jesus Christ, came the resurrection from the dead—a resurrection which can only apply to man; and so in like manner the sin and the penalty can only apply to man. Now these are the only passages that have the semblance of teaching the doctrine in question; and their plain interpretation we have seen makes the Bible responsible for no such dogma as that death has come upon the plants and inferior animals in consequence of man's sin.

Still farther—the Bible implies indirectly that decay and death prevailed before human apostacy took place. The divine will in reference to animated beings was expressed in the words " be fruitful and multiply." This involves the removal of individuals to make way for their successors—and secure the continuation of the species. Reproduction therefore requires death, otherwise the earth would soon be over-stocked, so that neither food nor even standing room could be had. The command, " be fruitful and multiply," therefore implied the operation of the law of death as a consequence. And again the threatening of death, in case of disobedience, addressed to our first parents, implies that they had some knowledge of what death was—otherwise it could have no meaning and no force or terror to them. But they could only have had a knowledge of what death was by seeing it in operation among the inferior creatures. Gifted with reason, and thus infinitely removed from the irrational creation, man was made aware that so long as he continued obedient he would be also distinguished from the beasts that perish by being free from that law of decay and dissolution under which they received existence; but if he transgressed, he was to be put on a level with them, and fall under the law of death. Such appears to be the plain teachings of Scripture on this point. No vast physical change is spoken of as passing over the whole constitution of nature, animate and inanimate, when man fell; as would have been the case had death then first found admittance. No great physical change even is said to have passed on man. It was mainly the soul—the immortal part—that was affected by sin; and its havoc here re-acted upon the body. Man was no longer fitted for the beauteous and luxuriant region called Eden—but now must go forth and wrestle with a barren earth outside, for his subsistence, and wring his food from a soil that yielded thorns and thistles if uncultivated; and now, too, subject to pains, diseases and decay, leading on to, and terminating in. death of the body, he had to anticipate the spiritual penalties of sin in that state into which death must introduce him; and thus death came to him clothed as "the king of terrors." From these woes and penalties he could only be rescued by that Redeemer who "abolished death and brought life and immortality to light." Now this view of the case implies, that constituted as man was originally, even had he remained innocent, it would have been necessary to remove one generation to make way for the next, by some process equivalent to death, but not having death's pains and terrors. On this point we have no distinct revelation; but it seems reasonable to suppose, that after having been preserved during his period of probation, man, had he continued sinless, would have been transferred without dying, to a more exalted state of existence. Such a change, to an innocent being, might have been not only free from all terror, but most desirable, as being painless in the process, and elevating in its results. Thus it might have been looked forward to with delight and welcomed with rapture. We know from Scripture that such a change is possible; and in at least two instances it has occurred. Enoch and Elijah, without going through the pangs of dissolution, were removed to heaven—they were not "unclothed but clothed upon, and mortality was swallowed up of life."—What took place in the case of these holy men might as easily have taken place in the case of the whole human family; and in all probability such would have been the happy lot of man had he not sinned. Multitudes, we are told, at the closing scene, will undergo the same great and glorious change.—"We shall not all sleep, but we shall all be changed—in a moment—in the twinkling of an eye; for the trumpet shall sound, and the dead shall be raised incorruptible, and we shall be changed."

It may be objected to this view that we cannot conceive of man, constituted as he is, being preserved from natural decay and death, and continued in immortal youth and vigour, during the period of an earthly probation. To this it may be answered that the arrangement by which, after a time, all animals and plants lose their vital force, decline in vigour gradually, and at last die, has no natural necessity attaching to it, but results from the sovereign will of the Creator. Had he so willed it, it may be that a slight modifying cause would have enabled the animal economy to go on for an indefinite length of time. And in excepting man originally from the law of decay and death, without a continued miracle, a slight alteration in his existing constitution might have enabled the machinery of his frame to work without decay for any length of time. Scripture seems to intimate mysteriously something like this in the narrative of the tree of life that grew in the Garden of Eden. After the fall it is said—"behold the man hath become as one of us, to know good and evil; and now, lest he should put forth his hand, and take also of the tree of life and live forever—therefore the Lord God sent him forth from the garden of Eden." It is evident, therefore, from this history, that the tree of life, to which man had access before his transgression, had some mysterious power of sustaining life by perhaps meeting and counteracting the tendency to decay, and renewing perpetually the vitality of the frame, as rest and sleep now do in an imperfect degree. Thus the vital force might have been perpetually renewed and life's springs sustained in undiminished vigour and freshness. After his fall man was excluded from this life-renewing antidote; and then the law of death obtained mastery over his frame, as it had always ruled over the frame of the inferior creatures.

It is clear, however, from the sacred narrative, that though the death of the body came as a punishment of man's sin, yet the penalty involved far more terrible consequences; and that physical death was rather an incidental than the main portion of the punishment. "In the day thou eatest thereof thou shalt surely die" was the threatening: but dissolution did not take place, in the case of our first parents, when they tasted the forbidden fruit. Something more therefore than the painful separation of soul and body must have been intended. The offence was *moral*—and to correspond with it the penalty must also be moral; from which we infer that it included all the spiritual consequences of rebellion against God—namely, death of the soul,—alienation of the heart from God,—loss of his favour, and endurance of his displeasure. As a consequence of this derangement of his spiritual part in its relation to God, man now fell into a state in which sorrow, pain, bodily disease and decay ending in death, assailed him; the terrors of a guilty conscience pursued him, clothing death in deepest gloom, and anticipating the terrors of the unseen state. This condition commenced the day man sinned: so that he entered on a state of death the moment he transgressed. His spiritual death involved him in physical death, and rendered the latter painful and terrible.—Hence the need of a Saviour, to reconcile man to God,—to take away sin, the sting of death,—to procure pardon and a title to heaven,—and give man the victory over death, and enable him even with the open grave in view to sing, "O death, where is thy sting; O grave, where is thy victory,"—"Thanks be unto God who giveth us the victory, through our Lord Jesus Christ."

These considerations seem to me to remove all serious difficulties, and completely and satisfactorily to harmonize the teachings of science and revelation. A wrong interpretation of scripture alone seemed to set it at variance with the record written in the book of nature. False science was unjustly laid to the charge of the Bible. When its utterances are fairly interpreted, it becomes clear that nature and revelation speak in harmonious accents; and declare the same truth. But though we can thus see a part of the whole, we must wait for another state of clearer vision to scatter every cloud. We can see that many benefits flow from the operation of the law of death among the inferior animals, and that it is productive of a greater amount of happiness than any other arrangement we can conceive of. Seeming evil is thus overruled so as to produce good. And so in the case of man—his fall and spiritual death led to that wondrous display of divine love—the redemption of the world by Jesus Christ; and thus may be evolved a greater good to the race than if man had remained innocent. But then when we ask why such glorious results could not have been obtained without transgression—why an All-Wise and Good Creator did not secure to man the blessing without the curse—and why through dark sorrow and tribulation, many sins and many tears, man has to be "made perfect through suffering"—here the great mystery of mysteries confronts us—the existence of evil in the empire of the infinitely powerful and good God—and we are compelled to bow humbly and own our ignorance and utter inability to solve the mighty problem. We have seen only a small part of the mighty drama of human existence passing before us—from this we cannot conjecture the meaning of the parts, still less their connexion with the closing scene. Why sin and death are actors at all, or what the whole results of their agency, only the revelations of eternity will disclose. Then, in the exercise of faith let us "wait the great teacher death, and God adore."

LECTURE VII.

Of all the natural sciences, Geology discloses the grandest views of creation, and bears the noblest testimony to the divine power, wisdom and goodness. From the very wreck and ruin of pre-existing worlds,—from pyramids of bones and the contents of nature's great charnel-house,—from successive ages of life and death that ran their mighty cycles long before intellectual man became lord of earth, this noble science has gathered the brightest offering reason has ever laid on the altar of its Sovereign. Geology has carried us away back to creation's morning-dawn, when, from a sea of crimson flame, the huge frame-work of the globe arose, and the granite foundations of the world were laid, by the Great Architect, above the fiery flood. Life had not yet received its divine commission—no sentient creature had yet appeared on the scene; and for long ages the globe was tenantless, not being fitted for the existence of animated beings.—Time is nothing with God—" a thousand years are" with the Eternal " as one day." He was then laying " the corner-stones" of earth, firm and sure, and " establishing them that they should not depart." It was the first step in his majestic plan,—the first preparation for the great evolutions of being that were to follow on this mysterious platform of existence. Even in the primeval granite rocks the embryo of the future was before the Divine Mind;—the elements of the present were there taking form and substance. And then geology bears us onward till these ages of dread solitude passed away, and the busy, joyous age of life commenced—when the primitive oceans teemed with existence, and luxuriant plants and trees overspread the dry land—when the majestic pine first threw its picturesque shadows over the earth and the primeval forests rang with the choral melody of songsters, or re-echoed with the war of the carnivorous creatures " seeking their meat from God":

" Wondrous forms with wondrous features,
Through the ancient oceans ran,
Plated fishes—horned creatures,
Ere the earth was fit for man.

"Lovely forms and noble races
From the mother-earth have passed—
Fabled fauns and fabled graces
Own your prototypes at last!

"Palm and fern that grew colossal,
Beast from field and bird from glen,
Now as dust and now as fossil,
Meet the wondering eye of men."

And as each race of plants and animals disappeared, new and yet lovelier forms arose at the fiat of the Infinite Creator—swept across the stage of being and sank into eternal sleep. Still, exhaustless nature poured forth new types of being—still, wondrous creations emerged, enjoyed and passed away. To all these it was said "occupy till man—creation's king—the epitome of all that precedes him—man 'made in the image of God' shall come." These previous ages were but the prologue of the great drama—the hero had yet to appear. And yet nothing was in vain,—all were parts of one mighty plan,—all working for one end,—all discover the Eternal Mind presiding over every change, regulating every movement, and guiding the play of nature's wheels in their majestic revolutions. The pre-existent creations were making preparation for the birth-hour of the present. Those strange varieties of animal life that sported over the rocks beneath our feet, and found a tomb in their bosom, had all some influence in preparing the globe for man. Not a marine insect of the ancient worlds—not a saurian, bird, or mammal but was a vital laboratory for carrying on the eternal change that the Creator's laws have ordained—not a plant but has had its share in working out that great process through which our earth has become fitted for man—that creature who, being a ray from the divine intelligence, is able to comprehend and adore, and, as nature's high-priest, to offer creation's worship to the Almighty Creator. Mark how the divine wisdom, foreseeing the future in the present, was making beneficent preparation for creation's expected guest, long ages before he appeared. That glowing central furnace, spouting forth pillars of flame, was fusing and casting those metals that man now extracts from the secret veins of earth, and turns into instruments for conquering the rude forces of nature, fertilizing the world, and aiding the march of civilization. Wanting even one of these metals—iron alone—how powerless in comparison would man be—how far behind his present stage of progression! And those very fires that prepared his metals, by their volcanic heavings hurled them up, through the superincumbent beds, so as to be within reach of man's hand. And then consider how that tangled luxuriance which, perhaps millions of years ago, wrapped the earth in such a garb of green as never was worn before or since, and those majestic forests that waved their foliage in the breeze when yet the world was young—connect themselves with our own nineteenth century. They were forming the great coal beds that now furnish fuel to a large portion of the human race. They sank to bottoms of oceans, where they lay for thousands of years, were covered by rocks thousands of feet in thickness, became in nature's laboratory coal; and were finally thrown up near the surface, where man can reach them.—Think of the benefits we are receiving to-day from these storehouses of the beneficent creator! Every railway train that rushes over the surface of earth, bearing men and merchandize onward, swift as the flight of the eagle through the air—hurried along by a fire-chariot which a touch of the finger can controul—so gentle is it—and which no force can resist—so powerful is it,—every steam ship that is now dashing aside the billows, and proudly defying wind and wave, as it "walks the waters like a thing of life,"—is dependent for its might upon the petrified primeval forests. In Britain alone fifteen thousand steam engines, moved by coal dug out of the earth, are doing the work of two millions of men; and moving machinery which accomplishes what would require the unaided labours of three or four hundred millions of men. And then consider how many millions of homes are warmed and rendered happy and healthful during the winter's cold, by these benevolent supplies accumulated under the Creator's hand;—how many cities, palaces, mansions and dwellings are lighted up brilliantly by the invisible gas extracted from the same rich stores;—and how, as his faithful servant, the steam engine deriving its strength from these ancient forests, is toiling for man—clothing the naked—manufacturing his tools and providing his thousand comforts and necessaries;—and can we fail to see that at least one object of these wondrous vegetable growths of primeveal ages was to render earth a meet residence for intellectual, progressive man. The electric wire itself, which is girdling the globe, and tending to make the whole race one great family, with thought answering to thought and heart to heart, was manufactured ages before man appeared. The metal along which the electric spark leaps, and becomes vocal, was cast in earth's great central fires, millions of ages before Wheatstone and Morse made the lightnings come and "say here we are." Thus wondrously and beneficently are all things made mutually dependent,—the present linked with the past; and thus we discern that all are portions of a beautiful cosmos,—a scene of order,—arranged by the All-Wise and watched over by the eye of Eternal Love. May we not, in view of that wisdom and goodness, that has so well ordered the arrangements of the past, look hopefully and trustfully to the future? There is a heart of love behind these mighty movements and all the play of these majestic forces. It is our Father's world we dwell in. Is it not a beneficent and beautiful home?—full of our Father's kind arrangements for our happiness, and mental and moral education? We may safely—

> "Leave the planets to their courses,
> Leave their dwellers to their fate,

Trust the old majestic forces,
Trust the power that could create."

Leaving these general views, let us pass to the subject which is more directly to engage our attention this evening,—namely, the deluge which occurred in the days of Noah, and is recorded in scripture. It is a question of deep interest whether Geology has discovered any traces of this great devastation, and is thus able to furnish corroborations of scriptural history ; or whether no evidence of its occurrence has been disclosed by the researches of geology, and none, from the nature of the case, need be looked for. Not many years since it was usual to refer all the extraordinary appearances presented by the different strata beneath the surface of the earth to the effects of Noah's deluge. When shells, bones, and other remains of animals were found, it was common to dispose of them summarily by saying they were antediluvian relics, and had been swept into their present situation by the flood. The superficial drift, composed of sand, gravel, pebbles, and huge boulders, which is so frequently found near the surface, was at once referred to the deluge ; sea-shells on the summits of mountains,—long valleys scooped out by the action of water, —caves full of bones,—all received the same explanation. To this day, among the ignorant and unreflecting portion of the community, these ideas are still prevalent ; and Noah's flood is put down as the cause of every wonderful appearance in rock or stratum ; but geology has dispersed such dreams among all men who are acquainted with the discoveries of science, or qualified to judge of the evidences which she presents. All the details I have laid before you in previous lectures, as to the way in which the crust of the earth has been formed, and the vast periods of time occupied in its formation, will satisfy your minds, I trust, of the utter absurdity of accounting for the presence of these animal and vegetable remains, and other appearances, by the action of a flood which was but of a year's continuance. The idea is so utterly opposed to the plainest evidence, that I shall not waste time in refuting it. The almost unanimous opinion of the best geologists now is that no traces of the deluge described in scripture have been found, or from the nature of the case could be discovered at present. The tendency to look for evidences of the flood, and the numerous supposed relics of it that have repeatedly been produced, have all been caused by the belief that the Noachian deluge extended over the whole surface of the globe, and covered all lands, and even the tops of the loftiest mountains. Independent altogether of geological discovery, there are, I think, insuperable difficulties in the way of such a supposition ; and the weightiest reasons for holding that the deluge only extended over the small portion of the world then occupied by the human race. These obstacles I shall now briefly state ; and then endeavour to prove, that a fair interpretation of the sacred record shows that only a partial deluge is described by Moses.

Looking at the Mosaic account of the deluge, and taking the common supposition that it literally extended over the whole earth, and covered the highest mountains, then there was needed for this purpose a body of water five miles in thickness above the present sea level. It is calculated that such a mass of water would be eight times greater than that now existing on the globe. The question arises whence could such an enormous quantity of water be obtained? It is not enough to say that God produced it miraculously and afterwards annihilated it. No one denies that Omnipotence could do so; but we must beware of inventing miracles gratuitously, when the sacred narrative refers the production of the waters to natural causes. The account in Genesis states that "the windows of heaven" were opened—a Hebrew phrase for rain,—and that this continued incessantly for six weeks. Besides, "the fountains of the great deep were broken up,"—that is, the waters of the ocean overflowed the land. But these natural causes would not produce a universal deluge five miles in depth. If you suppose the atmosphere to absorb all the water it is capable of retaining in solution, and then, by some sudden change, to discharge it on the earth, it is proved by mathematical calculation, that the whole of this watery store would form a sheet of scarcely five inches thick over the surface of the globe. The irruption of the ocean over the dry land, is equally insufficient to produce the result in question: for this would not increase the absolute quantity of water on the globe,—if diffused over the land it would lessen the quantity in the ocean.* If, however, we suppose a limited portion of the earth to be inundated, a continuous rain of forty days, and the gradual sinking of the district below the sea-level, or the elevation of the bed of the neighbouring ocean would produce such a deluge as Moses describes, rising slowly and gradually, and disappearing by evaporation, and a change of the relative elevation of land and sea. To suppose eight times the present quantity of water to be added to our planet, would increase the gravitating power of the globe, derange the whole Solar system, and require a series of stupendous miracles to save the whole from destruction.

Another serious difficulty arises from the preservation of the animals in the ark, if we suppose the deluge universal, and all animals destroyed but those which found refuge with Noah. On this subject I shall quote the forcible and striking language of Dr. Pye Smith. He says "of the existing mammalia, (animals which nourish their young by breasts,) considerably more than one thousand species are known; of birds fully five thousand; of reptiles, very few kinds of which can live in water, two thousand; and the researches of travellers and naturalists are making frequent and most interesting additions to the number of these and all other classes. Of insects, (using the word in its popular sense,) the number of species is immense; to say one hundred thousand would be moderate; each has its appropriate habitation and food, and these are necessary to its life, and the larger number could not live in water. Also the innumerable millions upon millions of animalcules must be provided for; for they have all their appropriate and diversified places and circumstances of existence. But all land animals have their geographical regions, to which their constitutional natures are congenial; and many could not live in any other situation. We cannot represent to ourselves the idea of their being brought into one small spot, from the polar regions, the torrid zone, and all the other climates of Asia, Africa, Europe, America, Australia, and the thousands of islands; their preservation and provision; and the final disposal of them; without bringing up the idea of miracles more stupendous than any that are recorded in scripture, even what appear appalling in comparison. The great decisive miracle of Christianity, the resurrection of the Lord Jesus,—sinks down before it." It is needless to enlarge on this powerful statement. The same writer shows that provision would have to be made for the inhabitants of the waters, as well as land animals, on the supposition of a universal deluge. The addition of such a large mass of fresh water to the ocean, would render it unfit for the existence of all creatures not formed to live in fresh water; and of those also adapted only to fresh water. To save these from destruction, therefore, acommodation for them must be found in the ark, however inconceivable the mode. Let me add to this the opinion of Professor Hitchcock, of America, who says—"A thousand species of mammalia, six thousand species of birds, two thousand species of reptiles, and one hundred and twenty thousand species of insects are already described, and must have been provided with space and food. Will any one believe this possible in a vessel not more than four hundred and fifty feet long, sevety-five feet broad, and forty-five feet high." He adds, "we have reason to suppose that the ark was constructed in some part of the temperate zone. Now suppose the animals of the torrid zone, at the present day, to attempt by natural means to reach the temperate zone, who does not know that nearly all of them must perish. Nor is it easier to conceive how after the flood they could have migrated into all continents, and islands, and climates, and how each species should have found the place exactly fitted to its constitution, as we now find them. Indeed, the idea of their collection and dispersion, in a natural way, is altogether too absurd to be believed." Such is the opinion of two men distinguished at once for great scientific attainments, and profound reverence for the Bible as the word of God. From these insuperable difficulties there is only one way of escape—by supposing that the deluge, though extensive, was local, and confined to a region of central Asia, then inhabited by man:—and that pairs and septuples of the most common animals in that region were preserved in the ark. I shall now endeavour to prove that such a conclusion is precisely that which a fair interpretation of the Mosaic narrative would warrant—that there is no authority in the Bible for believing the deluge universal; and that only an unfair inference from its history has rendered such a belief current. If this can be proved all difficulty vanishes; harmony is restored between science and revelation; and geology, as we shall see, corroborates the Bible history.

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* See Dr. Pye Smith's "Scripture and Geology."

The main question is whether the language of the Bible is such as to teach the universality of the flood clearly and absolutely, so that by no fair interpretation, can we suppose it to imply a local and limited deluge. At first sight, and on a superficial glance, we might conclude that no choice was left us as to the meaning of the Mosaic account, and that the terms used are unequivocally universal; but in this, as in many other instances, the first meaning that arises in the mind on reading hastily a passage of scripture, may not be the correct one. The passages which seem to imply a universal flood are the following:—" I even I do bring a flood of waters upon the earth, to destroy all flesh, wherein is the breath of life, from under heaven—and every thing that is in the earth shall die." " Every living substance will I destroy, from off the face of the earth." " And the waters prevailed exceedingly upon the earth: and all the high hills that were under the whole heaven were covered." Those who are familiar with the language of the Bible are well aware that when universal terms are employed, such as "all flesh under heaven"—"all the high hills that were under the whole heaven"—we are to understand them frequently in a limited sense, as signifying a very large amount in number or quantity. In other words, these universal terms are often figurative not literal; and are to be interpreted in a figurative, not in an absolute and literal sense. Innumerable examples of this might be produced. Thus in the history of Joseph we are told that " the famine was upon all the face of the earth"; and that " all countries came into Egypt to Joseph to buy corn, because the famine was sore in all lands." It is self evident that " all countries" " on the face of the earth" mean only some countries, that lay contiguous to Egypt; for of course that "all countries," literally, should send to Egypt for corn and carry it, as was the common method at that time, on the backs of asses or camels, to distant regions, was a physical impossibility. Again—in the account of the plagues of Egypt it is said " all the cattle of Egypt died"; but the connexion shows that only a great number is meant; for in the same chapter reference is made to cattle that remained in possession of the king and people, after the destruction referred to. It is also said " the hail smote every herb of the field, and brake every tree of the field"; but it is afterwards said that the locusts "did eat every herb of the land, and all the fruit of the trees which the hail had left." " This day," said God to the Israelites while in the wilderness, " will I begin to put the fear of thee and the dread of thee upon the face of the nations under all the heavens"; and yet only the

Canaanitish tribes and those on their frontiers could have been meant.— Take another instance from the New Testament; it is said that at the time of the Pentecost "there were dwelling at Jerusalem, Jews, devout men, out of every nation under heaven";—and with this statement is a geographical enumeration showing that by the phrase "every nation under heaven" was meant a region extending from Italy to Persia and from Egypt to the Black Sea. In the same way Paul says that in his day "the gospel was preached to every creature which is under heaven"—not literally so, but simply meaning that it was very extensively preached.— So in the description of Peter's vision it is said he saw a great sheet let down to the earth "wherein were all manner of four-footed beasts of the earth, and wild beasts and creeping things and fowls of the air." But who will suppose that literally he had a vision of all the different species of terrestrial animals. Common sense teaches us that the meaning is, a great number of these passed before him in vision. Frequently too we find the phrase "all the earth" signifying only the land of Palestine—at other times the Chaldean or Macedonian empire.*

Now here is a very important principle of interpretation established— that universal terms are often used when we must understand them with limitations. In the examples I have quoted, phraseology, precisely similar to that used in the narrative of the deluge, occurs, which cannot be understood literally and must be taken in a limited sense. And what we plead for is that the same liberty be extended to us when we come to interpret the Mosaic account of the deluge. It is utterly contrary to sound principles of interpretation to tie us down absolutely to the literal meaning of the words. When it is said "all flesh from under heaven" were destroyed, and "all the high hills which were under the whole heaven were covered"—why should we not understand these universal terms in a limited signification as meaning that a vast number of living creatures perished, and that many of the high hills were covered. If the literal meaning is insisted on, apply the same principle to every statement of scripture; and as we have seen you would make it contradict itself and assert falsehoods and impossibilities. We have precisely the same right to interpret the words figuratively as literally; and when we find the facts of natural history and geology, as well as other weighty considerations, giving their testimony against the literal sense, we make choice of the figurative; and we are justified in doing so by common sense, as well as by the principles of honest interpretation. Insuperable difficulties are removed by this course;—science and revelation are harmonized; and none of the laws of language is violated.

In accordance with this view of the narrative Dr. J. Pye Smith says —"Let us take the seat of the antediluvian population to have been in

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* See Dr. P. Smith and Hitchcock.

Western Asia, in which a large district, even at the present day, lies considerably below the level of the sea." "If then in addition to the tremendous rain we suppose an elevation of the bed of the Persian and Indian seas, or a subsidence of the inhabited land towards the south, we shall have sufficient causes, in the hands of Almighty justice, for submerging the district, covering its hills, and destroying all living beings within its limits, except those whom divine mercy preserved in the ark. The drawing off of the waters would be effected by a return of the bed of the sea to a lower level, or by the elevation of some tracts of land, which would leave channels or slopes for the larger part of the water to flow back into the Indian ocean; while the lower part remained a great lake, or an inland sea, the Caspian."

Only one objection to this view remains to be noticed. If the ark rested on the top of Mount Ararat, which is 17,000 feet high, then the waters, which here rose to such a high level, must have covered all other mountains on the face of the globe. But why suppose that the ark found such a lofty resting-place as the highest peak of Ararat, from which only a miracle could have enabled Noah and the animals to reach the plain below? The name Ararat was given to the whole range of the Armenian mountains; and it was probably on some height of moderate elevation, far south of the snow-clad summit now known as Ararat, that the ark grounded. This is rendered probable by the language of Scripture; for it is said the families of the sons of Noah "journeyed from the east and found a plain in the land of Shinar":—but Shinar is south of Ararat.—When the ark grounded, we are told Noah sent out a dove which came back, in the evening, with an olive leaf in her mouth; but no olives grow near the present cold region of Ararat. Suppose the ark to have rested farther south, and in a warmer region, and the olive might there have been growing luxuriantly.

There are two great lessons we may learn from the whole of the present discussion. One is the vast importance of a study of God's works as casting light upon the meaning of His word. This is the way in which science is more and more becoming the handmaid of religion—not only in corroborating the Bible, but in dispelling false interpretations that had gathered round it,—the products of human ignorance or folly. The discoveries of science are casting a beautiful light upon the sacred page—elucidating what was dark—scattering our doubts and leading us to see new glories and profounder depths in the great volume of revelation.—Thus, under God, that Book which constitutes the foundation of our faith, is not only receiving fresh confirmations as discoveries advance, but is brought home daily with greater power to our understandings and in purer loveliness to our hearts.

Another lesson we may learn is to dismiss all fear, as to the results of science, in their bearing on revelation. We have no reason to dread truth, from whatever quarter it comes. This will ever be found to harmonize with the teachings of revelation; and under this conviction, let us keep our minds open for every fresh truth wafted to us by the wings of science. Let us beware of adopting any notion, either in reference to science or the doctrines of the Bible, hastily, or on insufficient grounds; and holding it dogmatically. Rather let our course be, with patience and modesty, to inquire what says the word of God, and what is the utterance of His works: and then to place these results side by side,—making no compromise—hiding no fact—mutilating or concealing no evidence on either part, and we shall find a beautiful harmony presenting itself, and God will be found in His works giving testimony to His word.

LECTURE VIII.

It seems very evident that science has a great mission to fulfil in connection with revelation; and, under an over-ruling Providence, we see it engaged now in working out that mission. I believe that the Father of spirits, in arranging external nature and endowing man with such glorious intellectual powers, designed that his favoured creature should study his works, and advance in the pathway of knowledge and brilliant discovery, age after age. And I believe that the Creator, in such an arrangement, had a higher design than merely to supply man's physical wants, or render his outward circumstances more agreeable;—He also intended that scientific discovery should throw an ever-increasing light on the pages of that book with which the highest destinies of our race are bound up, and should crown it with an ever-brightening glory. Thus science, viewed in connection with the divine oracles, is seen to have a high religious purpose, and a holy end. Hitherto its results have been most important in their bearing on the Bible—not only has many an obscure passage been rendered clear and significant—many a portion rescued from the unholy grasp of infidelity—many a difficulty removed by the hand of science; not only has the Bible's theory and history of humanity received the most brilliant confirmations from the researches of science, but it has taught us also to see new truths in the sacred pages; to decipher their deep meaning more correctly; to discover a profounder significance in what was formerly read with a careless eye; and thus it is causing the glories of the Book to shine out in brighter radiance. Science has rendered already the most important services to the cause of christianity; and when her great orb is completed, there can be no doubt that she will weave many more fair chaplets for the brow of revelation. Has not astronomy, for example, enabled us to read with a new eye, and attach a far juster and profounder meaning to those passages of the Bible which refer to the mighty works of Jehovah,—the majestic plans of the Infinite mind, and the wisdom, power and goodness of Him who is from everlasting to everlasting? Consider what enlarged conceptions astronomy has imparted in reference to this God-created universe, and the attributes of Him whose hand fashioned all; and say we do not, in this light, see a thousand new beauties and a far-reaching significance in the pages of His Word that were dim or undiscovered before? Think too with what a fresh eye we can read many a passage of scripture now, by the light of that science whose teachings we have been endeavouring to expound! With what a different glance we look at this great earth on which we tread, when geology has unfolded its secret history, written on the stony tablets beneath the surface! Through what mighty cycles of change it has passed —how vast its age—how wondrous the story of its formation—how surpassing strange the long line of animated creatures that preceded the human race on earth! The sacred history begins now to shine upon us in its real meaning, and this grand and enrapturing; and by the new light which God has permitted to be thus cast on His Word, we discover a vastness and sublimity in "the deep things" it contains, that were unsuspected before. We understand better now the significance of that death "which passed upon all men,"—that it is not the mere physical dissolution which reigned among the irrational creatures, long before man's creation; but something connected with *sin*, and therefore mainly spiritual; and we are thus led to loftier thoughts of that redemption accomplished by Him who "abolished death." Not only has geology thus corrected some of the hard dogmas of theology regarding the mystery of death, but also cast light on the scriptural history of the deluge,—removing difficulties, and discovering its real meaning. And observe how these great results have been wrought out:—not by concealing or compromising a single truth discovered by science—not by shrinking in alarm from the great facts revealed in the works of God, lest they should contradict His word; but by the noble and manful course of following truth fearlessly; permitting science to demonstrate her discoveries on independent ground; and then comparing, in a candid spirit, the two records when fairly deciphered. The noble-minded, truth-loving men who led the way in this path, and taught mankind that all truth is harmonious, and that science is the friend of revelation, will be reckoned, by coming generations, the most eminent benefactors of their race. In the midst of obloquy and misrepresentation, and in the spirit of martyrs, they persevered, refusing all compromise, clinging to truth under every reproach; and now we are reaping the fruits of their labours,—now that very science which was once regarded with such dread and distrust, is beautifying and adorning revealed religion, and strengthening its foundations. The names of Chalmers, Buckland, Jameson, Sedgwick, Pye Smith, and Miller, will long be revered as leaders in the right path. It may seem strange to us that the true meaning of scripture was so long in coming to light; but this is not more strange than that the mind of God, in His works, should be so lately unfolded by science. Think what a darkness lay on the pages of the Bible up till the time when the Reformation scattered the clouds—how blind men were to its true meaning—how its bright truths were hidden and misrepresented! Then at once a flood of radiance was shed upon the holy oracles. But even the Reformation did not evolve all the truths of scripture. New glories are beaming forth under the radiance of science; and what unimagined brightness may yet be brought forth, by the same agency, who can say! It is cheering to see how out of darkness light is ever evolved—how error is fading before the presence of truth.

"Does not night bring forth the morning?
Does not darkness father light?
Even now we have forewarning,
Brothers, of the close of night.

"Many, many are the shadows
That the dawn of truth reveals,
Beautiful, on Life's broad meadows,
Is the light the christian feels.
Evil shall give place to goodness,
Wrong be dispossest by right.
Out of old chaotic rudeness
God evokes a world of light."

In the present lecture, we advance to a consideration of the only remaining point in which geological discovery touches the scriptural record—namely, the destiny of our globe and race. We have seen how geology has expanded our conceptions of the time during which our world has been in existence. Just as astronomy has widened our views of the extent of the universe—of those immensities where systems and galaxies are floating, as light-clouds, in the bosom of the All;—so has geology enlarged our ideas of that portion of the past eternity in which creative energy has been operating in our earth-home. Geology has familiarized us with the thought, that millions of years were occupied in forming the crust of the earth, and bringing it to its present condition—that its various beds are but the heaped-up dust of once animated forms—that so long has life been going on, and so abundant have been its manifestations, that almost every particle of matter must have once been alive. The organic remains that have been preserved, bear but a small proportion to the living forms that have been resolved into their elements, and have utterly disappeared. It sometimes happens that the geologist discovers in the sandstone, tracks of huge creatures, such as gigantic birds, that must have been twelve or fourteen feet in height, and enormous quadrupeds, of which no remains have been found;—their footprints on the sandstone are the only records they have left behind. If even these bulky animals have utterly vanished, how many races of smaller or more perishable creatures may have been swept away, "leaving not a wreck behind." And how vast the prolific power of nature, when whole mountain ranges are found to be composed of small shells! We are also now familiar with the truth that the condition of the earth was once very different from the present, and that it has again and again changed its inhabitants. A gradual improvement has been going on, from the earliest period of which we find a record. The earth has been slowly passing through changes which fitted it as a residence of higher and higher races of animals and plants; and a corresponding advance in its living occupants is discernible. The reign of fishes was followed by the reign of reptiles, and birds; then came the mammiferous creatures; and lastly responsible, immortal man. We thus discern a divine purpose in this progressive arrangement; we discover evidence of *mind* working to an *end*. All past processes have been subservient to the final result. There have not been merely creation and destruction; but at each change nature has been arrayed in a lovelier garb and the inhabitants of earth have been higher and higher in the scale of being; till man has stepped upon the scene, as lord of creation, "crowned with glory and honour, and made a little lower than the angels." Now from this history of the past are we able to divine anything regarding the future condition of our earth? If there has been progress hitherto—majestic and stately development—is it to cease now? Has perfection been reached and is farther advance hopeless? Even with our present imperfect views, we see that the present state of things is far enough from being perfect; and the history of the past leads us to anticipate an improved condition for our globe, and a nobler and more perfect race of beings as its inhabitants. Why should we imagine that the flowing tide of progress, on whose foremost billows we are borne along, should now be arrested? Then are we to believe that the human race, like preceding races of animals, shall pass away—become extinct, and utterly vanish from earth, to be followed by another race as far superior to man as man was to his irrational predecessors? Can it be that man—the intellectual monad—the only atom of intelligence on earth that can comprehend the Creator's plans—man—"how noble in reason! how infinite in faculty! in form and moving how express and admirable! in action how like an angel! in apprehension how like a god"! that he must take his place among the extinct forms; and with all his wondrous history sink into the abysses of oblivion? Is the human race included in the same doom with the saurians; and shall coming orders of beings study our organic remains in their museums, and trace our foot and hand prints on earth, as we now are doing in reference to preceding races? Shall the stillness of a mighty death hush into the silence of the sepulchre all this busy scene; so that man and all his works, with the scene on which he has strutted and fumed his little hour of life, shall be lost,—his existence "rounded by a sleep"? The thought is terribly oppressive. Our spirits shrink from such a fearful doom—our hearts shudder at such a dreary prospect and refuse to accept it;—the noblest feelings and aspirations of our nature rise up against it. That all now so beauteous and ennobling in human existence, allying us to the angels of light; the beaming eye of affection—the smile of the mother over innocent childhood—the self-sacrifice of hero and martyr,—

the glowing aspiration of poet and philosopher—the thoughts that range the heavens—the patience and gentle humility of suffering—the labours of the great and wise for the cause of humanity—the tear of penitence—the prayer of faith—the sweet humanities of home and kindred—the pure affections of parents and children—that all these should fleet away, leaving no memory—no monument—wrapped in the darkness of the grave—hushed in the silence of the charnel house—how awful the thought—how impossible to believe that this is the doom of god-like man! Here it is that the light of science fails us. It cannot penetrate the thick veil that hangs between the seen and the unseen; it can reveal nothing definitely of man's future on earth or his future beyond the grave. But here the light of revelation falls where we most require it, and are ready to welcome its teachings. And though it affords us only glimpses into that future, they are sufficient not to satisfy our curiosity, but to strengthen our faith and cherish our hope: and to these prospects science lends its corroborative testimony. What then says the divine oracle as to the destiny of the earth and man?

There are several intimations in the Bible on this subject; but the clearest and fullest is contained in the third chapter of the second epistle of Peter:—"But the day of the Lord shall come as a thief in the night; in the which the heavens shall pass away with a great noise, and the elements shall melt with fervent heat; the earth also and the works that are therein shall be burnt up. Seeing then that all these things shall be dissolved, what manner of persons ought ye to be, in all holy conversation and godliness. Looking for and hastening unto the coming of the day of God; wherein the heavens being on fire, shall be dissolved, and the elements shall melt with fervent heat. Nevertheless we, according to his promise, look for new heavens and a new earth wherein dwelleth righteousness."

Now it seems plain and undeniable that the inspired writer, in this passage, announces that at a period in the coming futurity which is not revealed and is known only to God, the present dispensation will be brought to a close; a vast change will pass upon the surface of our earth under the agency of fire; all that is combustible will be "burnt up"—the elements or first principles of things shall be "melted"; so that the earth will be reduced to the condition out of which it originally emerged of a liquid fiery globe. The apostle does not say that the earth is to be destroyed or annihilated—but only changed and renovated—transformed into a "new heavens and new earth." We know from the discoveries of science that no particle of matter can be annihilated by any known process; and that fire merely resolves combustible substances into their elements. The statement of the apostle is in entire accordance with this; for he speaks of the elements "melting" or being "dissolved," and the earth being "burned up." He does not assert or imply that the matter of the globe will be lessened, by the final conflagration; but that existing arrangements will be all broken up, and that a new economy, different from and superior to the present, will arise out of the chaos. This new creation he calls "new heavens and new earth wherein dwelleth righteousness"—adapted to pure and sinless beings, and inhabited by such.—The effect therefore of this universal conflagration will be a change of form, subservient to the most glorious purposes. A vast transformation is to pass over our earth. "The heavens"—that is the atmosphere, or region immediately surrounding the earth—will "pass away with a great noise"—the intense heat, as chemistry shows, would liberate hydrogen and other gases, which would, with a loud noise, rush into combination with the oxygen of the atmosphere, and alter it, so that it might be said to "pass away"; while the solid parts of the globe would be dissolved.—Such is the solemn announcement of the divine oracle as to the next great change through which our earth shall pass.

We have seen that the revelations of science corroborate the apostle's declaration as to the possibility of such a catastrophe, and the mode in which it would operate. Still farther, geology shows that all the elements, requisite for the final conflagration, are stored up in the earth itself, and only wait the Almighty fiat to effect their liberation. In a previous lecture I referred to the internal heat of the earth, and the fact that a crust, of only thirty or forty miles in thickness, separates us from the sea of fire that is surging in the interior of our globe. That such is really the condition of the earth is now put almost beyond a doubt. The existence of between two and three hundred volcanoes points to some huge furnace of which they are chimneys or vents, and whose molten contents they spread, in desolating ruin over the earth. The farther we descend beneath the surface of the globe the higher the temperature becomes.—Should the Almighty Creator so will it, this imprisoned fire-ocean could in a moment burst its barriers and spread utter destruction over this fair world. In addition to this, geology declares that the earth has already passed through changes similar to that which the Bible predicts. The broken and dislocated strata—the primary rocks, once fused by fire, hurled into mountain chains—the disappearance of previous worlds, and the repeated creations that have occurred—all tell of vast changes and terrific convulsions; and declare that there is nothing improbable or impossible in such a catastrophe as revelation announces. Besides—geology shows that all past changes have been steps in a great progress through which the earth and its inhabitants have passed, and the fair inference is that a future change will also be conducive to progress. So says the inspired record: "new heavens and a new earth, wherein dwelleth righteousness" are to succeed the present economy. The teachings of science and revelation are thus in complete harmony; and the inspiration of the Bible is thus strongly attested. That uninspired men could have shadowed out such a change, at an early period, so completely accordant with the investigations of modern science, is an outrage against all probability.

A question of deep interest, in connection with this subject, presents itself. Is the "new earth wherein dwelleth righteousness" to be our present abode, renovated, purified, and exalted in condition, so as to be the abode of true righteousness? When our earth has passed through this great change will it then become the paradise of the redeemed and holy throughout eternity? We cannot, by reason or scripture, completely determine this point; but, after a full consideration, I incline to the opinion that the heaven of the righteous will really be a renovated earth, not some other and distant region of the universe. The words used by the apostle admit this as the most natural interpretation. If he did not mean our present residence why should he call it "a new earth" surrounded by "new heavens" or another atmosphere? if a distant region is referred to wherefore name it "earth"? Wherever the heaven of the righteous will be the language of the Bible clearly implies that it will be a solid, material abode, and that the spirit will be clothed in a body superior to the present, but still material. And there is something very delightful in the thought that this earth, where sin has reigned so long, will yet be purified from every trace of the destroyer—fitted up as a glorious residence for righteous beings—surrounded by unimagined glories to delight the eye and exhibit the wonders of divine wisdom—will be the abode of the redeemed, where the God-man will manifest himself to the rejoicing inhabitants—and where "there shall be no more death, neither sorrow nor crying, neither any more pain, for the former things are passed away." That such is the destiny marked out for our globe in the inspired record, is the opinion of many of the best men, and ablest theologians; and has been held by some of the brightest ornaments of the Christian Church in all ages.

This great change that will pass on our earth is to be preceded by the resurrection and the general judgment. Not only will the earth be changed, but our bodies will undergo a corresponding change—so great that the apostle Paul calls them spiritual bodies. Now to the doctrine of the resurrection of the body a formidable objection, drawn from the discoveries of science, has often been urged. It is this: When the body is laid in the grave it is decomposed into its elements, and these pass away completely; enter into new combinations; and may form portions of other human bodies. The particles of which my body is now composed may have often previously formed portions of other bodies, and may, in the lapse of years, form the constituent elements of future bodies. How then can the same body that lies down in the grave be raised again? Whose shall those elements be in the resurrection that have belonged to so many different individuals? Even Omnipotence it is said cannot, on this account, raise up the identical body that went down to the grave. But science which raises this difficulty enables us to return a triumphant answer.

It tells us that the particles of which our bodies are composed are continually passing away and are replaced by new; so that in the course of our lives we repeatedly change the whole solid materials of our bodily structure; and yet we are the same individuals. A man fifty years old, has not a single particle in his frame that he had when thirty, twenty or five years old; and yet he is the same individual, who is made up of body and spirit. It is clear therefore that identity of body may be preserved, though there is not one particle the same; so that it is not necessary that the resurrection body should contain one particle of the matter laid in the ground, in order to be the same body. We are the same persons as when infants, though no one particle of the body is the same: and we may be the same after the resurrection, though no particle that is laid in the grave shall enter into the "spiritual body." It is the body belonging to the same soul,—not compounded of the same particles,—that constitutes it *our* body. The language of scripture is in entire accordance with this. The phrase "resurrection of the body" is not used in the Bible: it speaks of man's resurrection and of our being "changed"—"clothed upon"—"our vile body made like Christ's glorious body." The words of the apostle Paul in describing the resurrection, imply strongly that the same particles which are laid in the grave *shall not be re-assembled* at the resurrection. He employs the illustration of a seed sown: "that which thou sowest is not quickened except it die; and that which thou sowest thou sowest not that body that shall be, but bare grain, it may chance of wheat or of some other grain." Now we know that the seed and the plant that springs from it are very different things. The seed, placed in the earth is decomposed—"while the young plant is nourished chiefly from the earth, the rain and air: and whether any of the particles that composed the seed enter into the plant, is uncertain; but it is certain they must bear but a small proportion to the whole."* "Thou sowest not the body that shall be but bare grain (or seed), it may chance of wheat or of some other grain; but God *giveth* it a body as it hath pleased him, and to every seed its own body." So that as we do not sow the plant but the seed, and raise from it not the *same thing* that was sown but a *plant*, which is very different; "so is the resurrection of the dead;—it is sown in corruption, it is raised in incorruption." "Flesh and blood cannot inherit the kingdom of God."—How the resurrection body will be connected with the present we are not informed; but it is not asserted in scripture that the same particles which lie down will be raised; the contrary is implied in Paul's language. But a vast change will pass upon our frames——"the dead shall be raised incorruptible, and we shall be changed." May not this change of body be the appointed means for bringing about a vast change and improvement in the powers and tendencies of the mind?

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* Whately on the Resurrection.

New organs may awaken unsuspected and dormant powers of soul, of which at present we have no conception; just as the restoration of the sense of sight to a man born blind will develope the power of vision, which had lain dormant before. The glories that may burst on the redeemed, in " the new heavens and new earth," when clothed upon with a spiritual body, possessed of exalted endowments and meet organs for the purified spirit—bodies imperishable and incorruptible—not subject to disease or weariness—fit vehicles for the immortal spirit,—the happiness and dignity of such an exalted state imagination cannot conceive; for " eye hath not seen, nor ear heard, neither have entered into the heart of man, what God hath prepared for them that love him." And through eternity's circling ages, new and still more glorious manifestations will unfold themselves to the immortal spirit, as it ranges through the creation of God, studying His mighty works, acquainting itself with His perfections, and drinking at the ever-flowing fountain of Divine Love. " Now we see through a glass darkly, then face to face—now we know in part, but then shall we know even as also we are known."

LECTURE IX.

In previous lectures, our attention has been confined to the earth—our present habitation,—on whose surface we tread, and in whose bosom we are to find a sepulchre. We have been tracing its history as recorded in those gigantic folios, whose leaves are the mighty rock-masses and mountain-chains: we have glanced at those sainted relics preserved in stone which are so eloquent, when interrogated by science, regarding the worlds that arose and departed in the mighty past. The result of the whole was immensely to enlarge our conceptions of that period of the past eternity during which creative energy has been operating on our globe. We are now to rise to another view—to leave earth behind us, and taking a flight into the regions of infinite space, we are to enquire whether the Creator's workings are confined to our own globe—whether this earth-ball is the only theatre of existence, or to what extent, or in what modes, the Almighty architect has constructed other platforms of being. In the present lecture I shall endeavour, in plain and simple language, to convey to you some faint idea of the extent and grandeur of this God-created universe, as disclosed by modern astronomical science; and in the next lecture I shall discuss briefly the probability of those other globes with which infinite space is sprinkled, being occupied by rational existences, as in our own world. The subject is so vast that it would require a lengthened course of lectures to do it justice; and, at present, a brief and necessarily imperfect outline alone can be attempted.

In all ages of the world mankind have gazed with wonder, sometimes with worship, on the nocturnal heavens, gemmed with stars. It is the most sublime sight on which the human eye can be turned. Those deep-rolling heavens, so still and silent,—those glittering stars, glancing down upon our world with glittering brightness—like eyes of pity or love watching us from the far off heights of infinitude—those everlasting lamps that light up the streets of the city of God, faintly disclosing the long drawn aisles and majestic dome of immensity's temple,—inviting our thoughts to roam among worlds and systems, and galaxies that float in the bosom of the All, upheld by the Almighty hand—what deep emotions, and thoughts that grasp at eternity, have those glorious orbs kindled alike in the mind of the poet, saint, savage and sage! More than any other of creation's works they lift the soul to the Eternal One, of whom even the humblest blade of grass speaks eloquently. Familiarity with the gorgeous sight deadens our emotions, so that we gaze often unmoved or thoughtless into the star-lighted cathedral of God, and hear the music of the spheres, swelling and re-echoing along the vaulted dome: but imagine with what emotions our father Adam must have looked upon the great sight, when the first night "her sable skirt all fringed with light from the celestial walls" drew the curtain of darkness over the world! In flame-curtains he saw the sun sink below the horizon, and perhaps began to tremble for "this lovely frame—this glorious canopy of light and blue," lest its glory had forever been quenched; but lo! as the sun's rays fade away, Hesperus, the lovely star of evening rises, "like a gem on the brow of the night," and leads on the glittering host of heaven—disclosing gorgeous beauties which the sun's rays had obscured; "creation widens in his view"; its vastness is revealed by the darkness as it "falls from the wings of night." And there stood our first parent, with all the ripe faculties of a man, and the fresh, vivid feelings of a child, gazing upon the newly discovered wonders of the starry heavens—his spirit bowed in wonder and adoration—his heart uttering, "The heavens declare the glory of God, and the firmament showeth his handiwork."

"When the radiant morn of creation broke,
And the world in the smile of God awoke,
And the empty realms of darkness and death
Were moved, through their depths by his mighty breath,
And orbs of beauty and spheres of flame
From the void abyss by myriads came,—
In the joy of youth as they darted away,
Through the wilderness wastes of space to play,
Their silver voices in chorus rang,
And glad was the song the bright ones sang."

How natural our curiosity to know what are those glittering stars that make our night so solemn and beautiful! With the eye of imagination we might gaze upon them in rapt awe and wonder as "the poetry of heaven;"—but we want to know more; we long to "unravel the mystic dances of the sky,"—to ascertain their number, distances, and nature; to understand something of the ground plan of this miraculous universe. Even a child's earliest question has reference to the stars; its little finger points inquiringly to those bright objects, so distant in the gulfs of space that no geometry can measure the mighty span; and thus early are the thoughts brought in contact with immensity. The earliest generations of men must have engaged in the study of the starry heavens; and the latest will doubtless be found patiently pursuing the same lofty investigations; for even the small part of God's ways discernible from earth, will be more than enough for the little life of man. The first crude idea of men regarding the stars, in all probability, was, that they were bright points fastened in a sphere which, at no great distance from the earth, revolved round our present abode, and lighted up this vast world at night. Till modern times the notion was never entertained that these little orbs had any resemblance to our own sun, or that other globes similar to our earth, were visible during the hours of darkness. The earth was supposed to constitute the whole universe; and the sun, moon and stars to be little useful appendages doing duty around it. How vast the revolution of thought brought about by the investigations of the star-eyed science!—What a contrast between the primitive idea of the universe, and that which modern astronomy announces; between the interpretation of the starry scriptures of the sky, adopted by Chaldean shepherds, and that propounded by Newton, Herschell and LaPlace; or that lately read off by the telescope of Lord Rosse! Man's thoughts of his earth-home—of his place in the universe—of the extent of the Creator's works, have been absolutely revolutionized within the last three hundred years. Instead of looking upon the earth as the centre of the universe, and the heavenly bodies as ministering solely to it, he has discovered that the earth is but a mere atom of creation—bearing no more proportion to the whole than a single drop of water bears to the mighty ocean; that round the central sun, other globes, some of them immensely larger than the earth, are careering in their majestic rounds; that those bright stars are suns similar to our own, lighting up other systems of worlds—and that the more he increases the range of his vision, the more creation widens; new suns and systems gleaming dimly, as the telescope's space-penetrating power is increasing; so that there seems no end to God's universe—and in the effort to grasp its extent the imagination faints.

It is now matter of such familiar knowledge that every school-boy is acquainted with it, that our earth is in motion round the sun—rushing at the inconceivable velocity of 68,000 miles in every hour; so that with every beat of the time-piece we traverse nearly 19 miles of space. The diameter of our globe is about 8,000 miles—its circumference, 24,000 miles; and by the power of gravitation, lodged in the sun, it is retained in its orbit, and buoyed up in the aerial ocean of space. It is also a piece of commonplace intelligence that the earth is not the only child of the sun—other sister planets are also circling round the great luminary; some of them nearer than the earth and within its orbit; others vastly more remote. Mercury and Venus are nearer the sun than our globe, and smaller in size. Outside the earth's orbit, "the red planet Mars," about half the size of the earth, pursues its round, at the distance of 142,000,000 of miles from the sun—our globe's distance being 95,000,000 miles. Leaving Mars, a great gulf of 100,000,000 of miles sever it from the next body of our system—and we come to a group of minor planets, of which 29 have been discovered up till the present date. They are of small size; the largest not exceeding the kingdom of France in area. It is thought that this astral archipelago, or cluster of islets, formed originally one grand planet, and these twenty-nine small planets are its shattered fragments. Passing these, the largest planet of our system next meets us—the majestic Jupiter—480,000,000 miles from the sun—eleven times as large as our earth—having a diameter of 90,000 miles, and attended by four satellites or moons. Next to Jupiter, Saturn pursues his mighty rounds—having eight satellites and encompassed with a ring which is lately found to be divided into three separate rings. Uranus, with his eight satellites and a diameter of 34,500 miles, is placed next to Saturn; and, farthest of our planets, the lately discovered Neptune performs its annual course round the sun in 145 years, at the distance of 3,000,000,000 of miles from the sun. It is believed to have two satellites and probably a ring like Saturn. In addition to this retinue of planets, with their satellites, a vast number of comets are bound to our sun by gravitation, and flash away into the abysses far beyond the orbit of Neptune, returning after their long journey obedient to the mysterious force that chains them to the central sun. Of their nature we cannot now speak. These globes then—the planets, with their satellites, and the comets, together with the sun, make up our solar system. So vast is the sun, that were all the other bodies of our system united, his enormous bulk would be five hundred times as great. Such then is that system of coursing planets of which our earth is one. Clinging to the surface of one of these floating worlds we are whirled through infinite space.

But then the inquiry still remains—what are the stars? Of the number of stars visible to the naked eye, only five or six are planets belonging to our system; but what of the others—what of the immense number brought into view by the telescope? The investigations of astronomy have demonstrated that these are of quite a different nature from the planets. They are not opaque, but shine with their own, not reflected, light. This characteristic at once points them out as being of the same nature as our sun, and shining so much more feebly because vastly more remote than our luminary. Even the most powerful telescopes fail to magnify them, or to make them appear other than specks of light; mere luminous points as they appear to the naked eye. The astronomer can measure the other bodies of our system, by comparing their position as seen from different parts of the earth; but though, in her flight round the sun, our globe is at one time a hundred millions of miles on one side of the sun; and at another time, half a year afterwards, a hundred millions of miles on the other side,—thus changing our point of view two hundred millions of miles, yet this enormous space makes no change of place discernible in the fixed stars, as they are called. From this fact astronomers infer that any one of these stars must be at least two hundred thousand times as far off as our sun;—a space so vast that we can readily conceive how, being suns, they appear, even with the aid of the telescope, mere points of light. These stars then are distant suns; but if so, it is but natural to infer that they fulfil the same functions as our sun—sustain circling planets—light up encompassing worlds. Every star therefore we see in the vault of heaven represents a system of worlds—vast in magnitude—occupying a space as great, in all probability, as that embraced between Neptune and our sun. We thus arrive at the grand conclusion that there are as many solar systems as there are fixed stars. Every star may have as many or more planets rolling round it as our own luminary—each, it may be, a seat of life and a scene of beauty.—We may form some faint idea of the enormous distances that separate these suns, and of the inconceivable spaces occupied by them, when it is computed that the nearest fixed star is so distant from our sun that light, travelling as it does at the rate of eighteen millions of miles in a day, would require ten years to cross the gulf that severs our sun from its nearest fellow-sun. The unassisted eye can count some thousands of fixed stars, but these are only insignificant items of the whole. The weakest telescope reveals multitudes invisible to the naked eye.—Every increase of telescopic power brings myriads more to view; as though every region of space, to which we can penetrate, is strewn with blazing suns. In one place where they are more thickly sown than elsewhere Sir William Herschel reckoned that fifty thousand of these distant suns passed over a field of view two degrees in breadth, in a single hour. In the heavens there is a faintly white zone which spans the sky under the name of the milky way—"a circling zone powdered with stars," as Milton called it. This band of light is now ascertained to be produced by the blended rays of multitudes of stars, inconceivably remote; and it is computed that eighteen millions of suns send down their light to form this nebulous zone.

But even these myriads of suns are not all that the telescope discloses. In various regions of the heavens the astronomer has discovered little patches of light, which at first sight do not appear to consist of stars. They are mere bright specks, irregular and confused, of thin starry matter seemingly, having no definite shape. These are called nebulæ. These bright clouds, however, when examined by a telescope of high power, are found to be masses of stars: and what was before a dim confused light, is found to proceed from clusters of *suns*, at a distance so great that their united rays form only a faint cloudlet. The more highly the power of the telescope is increased, the greater is the number of those nebulæ which it causes to burst into star-clusters—thus revealing firmaments on firmaments in the far off realms of infinitude. Lord Rosse's telescope has resolved many of these nebulæ, that to all previous instruments seemed only dim, diffused stellar matter; and it is now a question with astronomers whether all are not resolvable, were our instruments sufficiently powerful. The farthest of these cloudlets observed by the astronomer Herschell was estimated by him to be thirty-five thousand times more remote than Sirius, the nearest fixed star. Many of these nebulæ, it is now certain, are clusters of suns—strata of stars—having some relation to one another, and severed from other similar star-masses.

Still farther—astronomy has ascertained that our sun is one such star, having its place in a stratum of stars, all of which make up a cluster similar to one of these nebulæ. To some observer therefore, in the distant regions of the universe, all these stars that gem our sky—all that the telescope brings into view, will loom out dimly as a faint nebula,—scarcely visible to the eye, and only showing the stars of which it is composed as diamond dust, when examined by a powerful telescope—if there be astronomers in other worlds to observe as we do. Thus not only are there solar systems—that is, suns having attendant planets—but also astral systems made up of solar systems, that is, composed of a multitude of stars having a certain relation to one another. Not only are the planets linked by gravitation to our sun, but the sun is bound to another invisible remote sun round which he is revolving, just as our earth sweeps round him. The sun is now ascertained to be in motion towards a point in the constellation Hercules; but so long may be the time occupied in his mighty revolution round the unseen centre of attraction, that man's day on earth may not occupy one such revolution. Thus then we have reached the mighty conclusion that all the stars we see around us form one great mass of suns, in which our luminary has a place; and that the infinite depths of space are occupied by similar beds of stars—severed from one another by abysses of darkness. The millions of suns that are blazing around only form one cluster—one little group, which to some distant world will seem a hardly discernible speck of light. Every dim nebula that looms from afar is a beacon telling of other star-groups as vast—other rolling firmaments—flashing suns—rushing planets! Could we soar away on angel's pinion through the fields of space, to the dimmest and most distant nebula that now seems a little cloudlet, it would burst into glorious suns like our own; but away beyond, other firmaments, undiscovered before, would gleam out of the blue gulfs of infinitude—new worlds, new systems, new galaxies. The imagination faints as it surveys the universe of God. Reason's wing refuses to soar amid these myriads of suns and worlds thus disclosed to view. Every little light-cloud is an island universe, made up of millions of suns, buoyed up in the bosom of the All. How vast—how utterly everpowering the conception! The wearied spirit pauses and finds relief in worship and adoration! This is God's universe. How great—how glorious the Infinite Mind that planned and executed the majestic structure! Truly "the heavens declare the glory of God." We forget earth in the contemplation of the endless glories of infinitude. Our little planet sinks into insignificance when we stand face to face with the sparkling jewelery of the heavens. A single particle of sand on the sea shore has some proportion to the whole mass; but our earth-ball has no measurable proportion to a creation that seems infinite. In the works of De Quincy I have met with the translation of the dream of a German poet, John Paul Richter, which is wild and fantastic, but imparts a sublime conception of the grandeur of God's creation. This is the dream:—

"God called from dreams a man into the vestibule of heaven, saying, "come thou hither and see the glory of my house." And to the servants that stood around his throne he said: "Take him and undress him from his robes of flesh; cleanse his vision, and put a new breath into his nostrils; only touch not with any change his human heart—the heart that weeps and trembles." It was done; and with a mighty angel for his guide the man stood ready for his infinite voyage; and from the terraces of heaven, without sound or farewell, at once they wheeled away into endless space. Sometimes with the solemn flight of angel wing they fled through Zaarrahs of darkness, through wildernesses of death, that divided the worlds of life; sometimes they swept over frontiers that were quickening under prophetic motions from God. Then from a distance that is counted only in heaven, light dawned for a time through a sleepy film; by unutterable pace the light swept to them,—they by unutterable pace to light; in a moment the rushing of planets was upon them; in a moment the blazing of suns was around them. Then came eternities of twilight that revealed, but were not revealed. To the right hand and to the left towered mighty constellations, that by self-repetitions and answers from afar—that by counter positions built up triumphal gates, whose architraves, whose archways—horizontal, upright, rested—rose—at altitudes, by spans that seemed ghostly from infinitude. Without measure were the architraves—past number were the archways—beyond memory the gates. Within were stairs that scaled the eternities above—that descended to the eternities below; above was below, below was above, to the man stripped of gravitating body: depth was swallowed up in height insurmountable—height was swallowed up in depth unfathomable. Suddenly, as thus they rode from infinitude to infinitude—suddenly, as thus they tilted over abysmal worlds—a mighty cry arose that systems more mysterious—that worlds more billowy—other heights and other depths, were coming—were nearing—were at hand. Then the man signed and stopped—shuddered and wept. His overladen heart uttered itself in tears; and he said: "Angel, I will go no farther. For the spirit of man aches with this infinity. Insufferable is the glory of God. Let me lie down in the grave from the persecutions of the infinite—for end I see there is none. And from all the listening stars that shone around issued a choral voice, "The man speaks truly—end there is none that ever yet we heard of." "End is there none?" the angel solemnly demanded. "Is there indeed no end? And is this the sorrow that kills you?" But no voice answered, that he might answer himself. Then the angel threw up his glorious hands to the heaven of heavens, saying, "End is there none to the universe of God? Lo! also there is no beginning."

I conclude in the words of Bryant's fine hymn—"THE SONG OF THE STARS":—

"Look, look, through our glittering ranks afar,
In the infinite azure, star after star,
How they brighten and bloom as they swiftly pass!
How the verdure runs o'er each rolling mass!
And the path of the gentle winds is seen
Where the small waves dance and the young woods lean.

"Away, away, in our blossoming bowers,
In the soft air wrapping these spheres of ours,
In the seas and fountains that shine with morn,
See love is brooding and life is born,
And breathing myriads are breaking from night,
To rejoice, like us, in motion and light.

"Glide on in your beauty, ye thoughtful spheres,
To weave the dance that measures the years;
Glide on, in glory and gladness sent,
To the farthest wall of the firmament,—
The boundless visible smile of Him,
To the veil of whose brow your lamps are dim."

LECTURE X.

With the truths stated in last lecture ascertained, another inquiry of profound interest immediately presents itself to the mind. What purpose do all these myriads of suns, with their circling planets, serve? With what design has the Omnipotent Creator called them into existence and poised them in their majestic orbits? Are they like our own world, scenes of life, and populated by rational and irrational creatures? Does animal existence, throughout these other provinces of God's empire, leap joyously—disporting itself in ocean, or air, or on the solid earth? Does the condor spread his huge pinions in their atmosphere, or the lion make their forests resound with his roar? Or are there intelligent, immortal creatures in these other bodies of space—having hearts throbbing with human emotions—loving, pitying, adoring? Does the tear of sympathy fall—the soft sigh of gentle pity heave the bosom—is heart drawn to heart by affection's golden chain? Are there poets, philosophers, sages there, reading new pages of God's great folio of creation? Does the prayer of faith—the anthem of praise, rise from these worlds to the throne of the Eternal?

"With a calm and awful pleasure,
Look into the lonely sky,
Where the spheres, with rhythmic measure
Now approach the sun, now fly.
Never voice is heard and never
Is their circling journey done;
You may see them rolling ever,
Silent children of the sun.
Are there fathers, are there mothers,
Are there friends and lovers there?
Do sweet sisters let their brothers
Braid white roses in their hair?
Have they pains and have they pleasures?
Have they loves and hatreds too?
Have they old poetic measures?
Do they wed and do they woo?
Have they sped through vale and mountain,
Chariots winged with steam and fire?
Does some Genius leave the fountain,
When their creeds, like ours, expire?"

Undoubtedly one of the grandest subjects of thought to which science invites us, is the Plurality of Worlds—the possibility that those other bodies, whose vast size and mighty distances astronomy has revealed, are platforms of being—teeming with countless populations, like our own world. It is curious to observe that very recently a warm controversy on this subject sprang up, and is not yet settled. About three years ago an anonymous volume appeared under the title of "The Plurality of Worlds—An Essay." The book at once attracted much attention, not only for the consummate ability with which it was written, but also on account of the strange, paradoxical opinions which it contained in reference to the constitution of the material universe. The writer was thought to be Dr. Whewell of Cambridge—one of the most distinguished philosophers of Britain. His aim in this singular volume is to throw doubt upon the opinion generally held, that there are other inhabited worlds besides our earth; and to establish the theory supposed to have been long since exploded, that our globe alone is inhabited—at least by rational existences—that it is, as he calls it, "the domestic hearth of the universe,"—and that we have no ground for believing the other bodies of space to be populated. Great ability has been displayed, and vast stores of knowledge lavished in the attempt to establish this extraordinary theory —worthy of the dark ages, when science was yet unborn. The attempt is felt by most, if not all, competent judges, to be a failure,—an ingenious piece of special pleading, to sustain a bad case. Still the discussion it has raised has been most beneficial. It has called forth several able replies—the most popular by Sir David Brewster. And the grounds on which the common opinion is held have been examined afresh, with all the aids derivable from recent scientific discovery. The result I think is to establish the great doctrine of a plurality of worlds more firmly than ever. In a short lecture, it is of course impossible to enter deeply into the merits of this wide controversy; and I shall only indicate a few of the more important points on both sides, in the great argument.

The grand argument in favour of a plurality of worlds rests upon analogy. We reason from what we know of our own world—its arrangements, and the purposes it is serving in the divine economy—to the condition of other bodies similarly circumstanced. Our own globe we know has long been the seat of life, and is now the residence of rational immortal creatures;—it is sheltering and sustaining countless myriads of living creatures, and, in all its wondrous benevolent arrangements, is adapted for this very purpose by the Creator's hand. But our earth is only one of a numerous family—one of a train of planets, all having, with many diversities, a true family likeness; all revolving round the sun, obedient to the same laws—basking in the same rays—having alternations of day and night, and similar changes of seasons. Now these very arrangements which are common to all, fit our earth for being the abode of man and other happy rejoicing creatures ; and is it not a conclusion stamped with the very highest degree of probability, that these similar though varied arrangements in other planetary bodies, fit them also to be the residences of various other orders of living, happy creatures, with rational beings at their head? This conclusion is so plain and obvious that it is difficult indeed to escape from it. So soon as the true planetary arrangement was made known, it at once impressed itself on general belief ; and has been generally, if not universally, held by the higher orders of intellect. If one globe of a great retinue wheeling round the sun is populated, on what ground can we conclude that all the others are dreary, untenanted wildernesses? If there are earth-born creatures, wherefore refuse to believe in the existence of planetary creatures—of Neptunians, Uranians, Saturnians, Jovians, and Lunarians? If we hold the doctrine of an intelligent Creator can we believe that he has balanced those majestic orbs in their courses, and adjusted their movements with such delicate accuracy, merely to be lumps of dead matter rushing everlastingly through the fields of space—gazed at perhaps occasionally by the eye of the astronomer, but sustaining life in none of its beauteous shapes—nursing no heirs for immortality—containing no creature fitted to understand the Creator's works, or lift up the voice of prayer or praise? We feel that to ascribe such an arrangement to Infinite Wisdom would be derogatory to the character of the Most High. It would moreover contradict all the deductions of our reason in reference to the portions of his works with which we are acquainted here. If, when crossing the ocean in one of our steam-driven ships, we saw at some distance another vessel precisely similar to our own —pouring out from a funnel volumes of dark smoke—showing an array of masts and spars and sails resembling our own, and moving similarly through the waves—the paddle-wheels flinging up clouds of spray,—though we could see no human being on board, owing to the distance, yet would we not conclude that this vessel was really the carrier of creatures like ourselves, because adapted for the same purposes as our own ship? And if we passed a fleet or many fleets of such vessels, we should conclude the same of every individual ship. Thus the irresistible conclusion flashes upon us that those other bodies of space, so similar to our own globe, are really sailing the azure depths, freighted, as our world, with living intelligent creatures. The absurdity of the theory that our earth alone is inhabited is thus powerfully characterized by Sir David Brewster. After referring to the fact that our sun with all its attendant planets is in motion round an unseen centre, at the rate of fifty-seven miles in a second, and yet that it may require thousands of centuries before it completes a single round of its orbit ; he says " this displays in the most striking manner the absurdity of the opinion that machinery so vast is to remain in action during cycles so long, and that an ephemeral race like our own, seated in so small a chariot, may be the only passengers which are thus wafted through universal space—enclosed within the orbits of magnificent globes and the network paths of a thousand comets. The mind recoils from a sentiment so absurd and so incompatible with every idea which we can form of the economy of wisdom and of power which is exhibited around us. It is a sentiment indeed which if the astronomical mind could give it a moment's consideration, it would place in the same category as that of a fleet of merchantmen chartered to carry a single grain of mustard seed to the Great Mogul; or that of the largest possible railway train making the round of Europe with no other passenger than Tom Thumb." He adds —"To suppose that the Almighty filled universal space with light, or its medium, streaming from worlds innumerable to worlds that cannot be numbered, with no eye to receive it but that of the tiny occupants of the little star on which we dwell, and which intercepts only an infinitesmal of its rays, and that he launched those innumerable worlds on their eternal path, in order that the descendants of Adam might study their motion, and write books upon astronomy, is an opinion which could only find credence in minds of the most limited capacity, and in hearts devoid of all sympathy and feeling." "To our minds such a condition of a planet,—of the solar system—and consequently of the sidereal universe would be the same as that of our own globe if all its vessels of war or of commerce were traversing its seas with empty cabins, and freightless holds—as if all the railways on its surface were in full activity, without passengers and goods—and all our machinery beating the air or gnashing their iron teeth without work performed. A house without tenants, a city without citizens, present to our minds the same idea as a planet without life, and a universe without inhabitants." This powerful statement of the case requires no comment; and I conceive no amount of logic-chopping, or special pleading, will avail against the great argument thus built on analogy.

When, with the aid of modern science, we compare our globe with any of her sister-planets, we find so many points of resemblance that we are confirmed in holding the inevitable conclusion that they are the abodes of life like our own world. Outside the orbit of the earth the "red planet Mars" pursues his rounds. You have no doubt often seen this fiery globe gemming the evening sky and mounting the great star-spangled vault—

> "With green waters round him splashing
> And with rocks of ruddy stone,
> Is the star of battles flashing
> As he circles next our own."

Very finely does poet Longfellow turn this warrior planet to a moral purpose—making him the preacher of fortitude and patient toil and endurance in the battle of life.

> "And earnest thoughts within me rise
> When I behold afar,
> Suspended in the evening skies,
> The shield of that red star.

"O star of strength I see thee stand,
And smile upon my pain;
Thou beckonest with thy mailed hand,
And I am strong again.

"Within my breast there is no light,
But the cold light of stars;
I give the first watch of the night
To the red planet Mars.

"The star of the unconquered will,
He rises in my breast,
Serene and resolute, and still,
And calm and self-possessed.

"And thou too whosoe'er thou art
That readest this brief psalm,
As one by one thy hopes depart,
Be resolute and calm.

"O fear not, in a world like this,
And thou shalt know, ere long,
Know how sublime a thing it is
To suffer and be strong."

But what does the star of battles—from whose "blue tent a hero's armour gleams" tell us of the probability of his bearing in his bosom creatures like ourselves? Mars is found to have a day almost exactly twenty four hours in length;—his density is nearly the same as our earth, though he is but half its size; his polar regions, like our world, are covered with snow which disappears as the heat of summer approaches; oceans, continents, and green plains are discernible on his surface through the telescope; and clouds are seen floating in his atmosphere. How close therefore the resemblance between our earth and Mars;—how great the probability, amounting almost to moral certainty, that he is the residence of organized beings, having at least an analogy to those on earth! Take again Jupiter—the largest planet of our system—whose diameter is more than ten times that of the earth, and whose size is twelve hundred times greater. Its shape resembles that of the earth, being flattened at the poles, and protuberant at the equator;—it has a day of nine hours and fifty-six minutes—changes of seasons similar to our world; and most striking of all it has four moons to light up its brief night; and evidences of trade-winds present themselves. Shall we say that these arrangements which on earth subserve the happiness and comfort of sentient beings, in the mighty orb of Jupiter serve no useful end! I cannot dwell further on the many analogies which the planets present—all intimating that they have been created for a similar purpose. If then our own solar system is fitted up as a home for sentient existences, we cannot resist the conclusion that those other solar systems, with their myriads of attendant planets, are in like manner the abodes of living beings.

The conclusion however at which we have arrived must be guarded by certain limitations. We are not to imagine that other worlds are simply a repetition of our own—that the same species of animals dwell there—that men like ourselves tread their surfaces. This were to limit the wisdom and power of the Infinite One. The inference rather should be that as the circumstances of these globes are in many respects strikingly different from those of ours, there is a corresponding diversity among their inhabitants. New wonders of creative wisdom doubtless here unfold themselves—beings perhaps far higher in the scale of intelligence than man, inhabit those distant provinces of God's empire. There may possibly be some resemblance between the creatures of earth, and those of Mars and Jupiter; but identity is not indicated. In physical, mental, and moral power, they may be far our superiors; they may, for ought we know, be basking in the Creator's smile, sinless and holy. Sin may not have darkened any world but this. And what diversities of form there may be, suited to diversity of residence; just as we see the different zones of our earth having each its peculiar residents. Fontenelle, who wrote long since on the plurality of worlds, supposed beings like ourselves to inhabit the nearest planets—creatures of extreme vivacity in Mercury; of voluptuous and ardent natures in Venus; of more robust and manlike character in Mars: while to Jupiter and Saturn beings of dull and torpid constitution were given. Of course this is merely fanciful. Sir Humphrey Davy, in a vision which he describes, saw creatures of the most marvellous structure, with membranous bodies, and strangely convoluted elephantine probosces as organs of sense and intelligence, gifted with far higher intellectual capacities than the men of this earth, inhabiting Saturn; to which we may add that a very ingenious and scientific poet, Patrick Scott, author of "Love in the Moon," has recently depicted beings in the moon with an internal body and external soul; an arrangement rather difficult to conceive of. On this subject Sir David Brewster strikingly exclaims—"Is it necessary that an immortal soul should be hung upon a skeleton of bone, or imprisoned in a cage of cartilage and of skin? Must it see with two eyes, and hear with two ears, and touch with ten fingers, and rest on a duality of limbs? May it not reside in a Polyphemus with one eye-ball, or in Argus with a hundred? May it not reign in the giant forms of the Titans, and direct the hundred arms of Briareus? But setting aside the ungainly creations of mythology, how many probable forms are there of beauty and activity and strength, which even the painter, the sculptor and the poet could assign to the physical casket in which the diamond spirit may be enclosed; how many possible forms are there beyond their invention which eye hath not seen nor the heart of man conceived?" And again he says, "What inconceivable and countless functions may be assigned to that plurality of intellectual communities, which have been settled, or are about to settle, in the celestial spheres? What deeds of heroism, moral and perchance physical! What enterprises of philanthropy—what achievements of genius, must be required in empires so extensive, and in worlds so grand!" "The being of another mould may have his home in subterranean cities warmed by central fires,—or in crystal caves cooled by ocean tides,—or he may float with the nereids upon the deep,—mount upon wings as eagles, or have the pinions of the dove that he may flee away and be at rest." We see then from all this, that we have no reason to suppose other worlds to be facsimiles of our own. The conceivable variety of form and endowment is limitless; and Infinite Wisdom is inexhaustible.

There is, however, another limitation with which we must receive the doctrine of a plurality of worlds.—We are not to suppose that *all* the bodies which form our system must be, without exception, inhabited worlds. While it is true that where the conditions of existence are so different from those of our world that no creature of earth could exist, other beings with organizations and functions inconceivable by us, may enjoy existence; yet there may be bodies in space that are intended to serve other purposes than to be abodes of animal life. The sun may be inhabited, for aught we know: beneath his radiant atmosphere there may be a fit residence for animated existences. Yet it may not be so; and his only use may be to serve as a centre of motion, heat and light to the planets. The moon again is found to be destitute of an atmosphere; so that creatures breathing air cannot exist there. She produces our ocean tides, and enlightens our night, and that may be her main function. The same may be true of all the other satellites of our system. There is no reason whatever to suppose comets to be habitable worlds; they serve quite other purposes at present undiscovered. We must therefore beware of overloading or exaggerating the great argument, by endeavouring to maintain that all bodies of space are inhabited worlds. Where the evidence renders it improbable or doubtful that bodies, such as the moon or the comets, are seats of life, let us freely surrender such as tenantless; the doctrine of a plurality of worlds is not thereby weakened. Within the due limitations we have indicated, the great analogical argument is conclusive and unassailable.

LECTURE XI.

LOOKING back at the mighty achievements of science during the last three centuries—the powerful impulse under which it has advanced, and the majestic strides it has taken within that period, we naturally ask what glorious results may not the next three centuries witness? Consider also that the pace at which science is advancing is not uniform but accelerated. Each fresh discovery seems but to prepare the way for another still more startling, which, in its turn, fades into insignificance before a third, of wider significance and more enrapturing grandeur. Every revolving year witnesses an amazing increase in the velocity of science. The past fifty years have witnessed far more brilliant discoveries than the previous two hundred and fifty years; and the past twenty years have seen the boundaries of science extended much farther, in that time, than they had been during the previous half century. Thus, for example, up till the year 1840, intelligence could not be transmitted swifter than a horse could gallop; so that from the days of Job till that time, little or no progress had been made in the means of communicating thought from place to place. In ten years after, the lightning was the messenger; so that, at one bound, science cleared the space between the speed of a horse and the speed of lightning. Some fifty or sixty years since, the history of our globe was all but unknown; the infant science of geology was struggling into notice amid the scowls of many and the fears and tremblings of the great majority. Consider the proud position this science now occupies—the array of brilliant discoveries to which we can point—the illustrious minds that are now devoting all their energies to the exploration of this new field. Astronomy, chemistry, physiology, botany, and all the kindred sciences, have taken mighty strides during the same period. Can we doubt, then, looking at all this, that

> "Through the ages one increasing purpose runs,
> And the thoughts of men are widen'd with the process of the suns"?

How different the conceptions of men now regarding God's universe—regarding the ways and workings of the Eternal, from the former crude ideas of ignorance! How much truer and more quickening and elevating our views of the material creation! How much we owe to those great and noble souls who have explored for us these new fields of creation, and returned and laid their spoils at our feet!

> "Who through long days of labour,
> And nights devoid of ease,
> Still heard in their souls the music
> Of wonderful melodies."

They have laboured and we have entered into their labours. And if we possess so many advantages compared with those who have gone before us, do we not sometimes feel inclined to envy the condition of those who shall come after us, when we anticipate the vastly increased flood of knowledge that shall reach them, and the more brilliant light that shall beam upon these coming generations, in comparison with which ours is but as the morning's dawn!

> "Alone I stand,
> On Life's high mountain-top, whence I behold
> Suns yet unrisen, manifest in clouds
> Of purple light, and light incarnadine,
> Light, golden and blood-radiant, sprinkling space.
> As Moses, on the top of Pisgah, saw
> Broad lands, though disinherited of them;
> So underneath the morning red, I see
> The splendours that shall come, and die content."

Looking to the great and illustrious future of humanity—the noble ages that shall dawn when christianity, with its hand-maid, science, shall have elevated our race to heights now undreamed of, can we not all enter into the poet's aspirations when he says:—

> "Well—were it not a pleasant thing
> To fall asleep with all one's friends;
> To pass, with all our social ties,
> To silence from the paths of men;
> And every hundred years to rise
> And learn the world and sleep again;
> To sleep through terms of mighty wars,
> And wake on science grown to more,
> On secrets of the brain, the stars,
> As wild as aught of fairy lore;
> And all that else the years will show,
> The poet-forms of stronger hours,
> The vast republics that may grow,
> The Federations and the powers;
> Titanic forces taking birth
> In divers seasons, divers climes;
> For we are ancients of the earth
> And in the morning of the times.
> So sleeping, so aroused from sleep,
> Thro' sunny decades, new and strange,
> Or gay quinquenniads would we reap
> The flower and quintessence of change."

Christianity spreads before us a still more brilliant future than that of which the poet has thus fondly dreamed. It discovers to man an endless vista of glories—eternity to advance in—God's infinite creation to explore—never ending progression in knowledge, in love, in goodness, in devotion. May not the study of God's works and ways, in those brilliant orbs that are rolling through space, be the employment of the redeemed? Our anticipations soar beyond the bounds of earth. What raptures may we not look forward to—what rivers of pleasure physical, intellectual, social! What new fountains of wisdom will the sage drink as he "summers high upon the hills of God." How the long-parted ones of earth will thrill under affection's grasp which shall never be torn away by the hand of death! How the earth-weary pilgrim will enjoy his repose—how the broken-hearted will put on the garment of gladness!

"How welcome those untrodden spheres!
How sweet this very hour to die!
To soar from earth, and find all fears
Lost in thy light—Eternity.

"Oh! in that future let us think
To hold each heart the heart that shares:
With them the immortal waters drink,
And soul in soul grow deathless theirs."

I spoke in last lecture on the deeply interesting topic of a plurality of worlds, and endeavoured to bring before you the great argument, derived from analogy, in favour of the doctrine that the other globes moving through space are occupied by living creatures, with intellectual and moral intelligences at their head, just as is our own world. Of course, from the very nature of the case, there can be no such thing as demonstration on such a subject; but so strong and conclusive is the analogical argument that I conceive it approaches as near to moral certainty as any other instance of probable reasoning. We know that our own globe is designed and adapted as a residence for sentient existences; and we infer that other globes, similarly circumstanced, have been created for a similar end.—Looking at the mighty maze of worlds upon worlds pursuing their majestic rounds—at the infinitude of creation—the mind revolts from the thought that these orbs are all tenantless wastes with the exception of this little planet on which we stand, which is but an insignificant atom in creation's vastness, and in no way distinguished from the other bodies of space.—The mind refuses to believe that all this vast machinery is in motion—that the sun with his train of planets and comets is in motion round an unseen centre—that these other glittering suns are performing their mystic dances and lighting up myriads of dreary uninhabited worlds, and that our earth alone bears in its bosom creatures fitted to love, and adore the Infinite One. The poet's question instinctively rises to the lips as we contemplate man and his place in creation—

"Think you this mould of hopes and fears
Could find no statelier than his peers
In yonder hundred million spheres."

To suppose these suns with their attendant planets to be mere inert masses of matter pursuing their everlasting journeys through space, would be to represent them as " mocking the creative majesty of heaven." Reason rejects such a theory, and the moral instincts of our nature rise up against it. We delight rather to contemplate these other worlds as the homes of happy rejoicing creatures;—as spreading before us limitless fields where supreme and superintending Wisdom and Goodness may furnish new manifestations; and in which myriads of other beings, however different from ourselves, are dwelling under the smile of the same beneficent Father. Nay, we rise higher; and in the noble language of Chalmers, we ask, "Is it presumption to say that the moral world extends to these distant and unknown regions; that they are occupied with people; that the charities of home and of neighbourhood flourish there; that the praises of God are lifted up there and his goodness rejoiced in; that piety has there its temples and its offerings; and the richness of the divine attributes is there felt and admired by intelligent worshippers?"

Now this doctrine of a plurality of worlds is supposed to be beset by certain religious difficulties, the most important of which I shall now briefly notice. It is thought that to some minds this view of the universe we have been unfolding, tends to cast discredit upon the Christian revelation, and to render the gospel a tale difficult of belief. Suppose you were walking in some quiet country scene in a still summer evening. The setting sun seems to pause fondly over a scene he has beautified and blessed; and then surrounded by flame curtains he grandly retires to his repose. One by one, as God draws the curtains of darkness over the world, the glittering stars shine out, as "gems on the brow of the night;" and soon the whole firmament is lighted up with these lamps that disclose the long-drawn aisles in the cathedral of immensity. You gaze upwards into the dimly lighted streets of God's city whose domes are the galaxies whose turrets and battlements are the firmaments of suns. Over head the milky-way spans the illimitable vault, spreading its foam-like light, derived from myriads of suns far sunk in the depths of space. You gaze into boundless space, and picture it sparkling with suns—foaming with rushing worlds; and you think of those undiscovered depths, which even the telescope cannot reach, as occupied, in like manner, by coursing planets—blazing suns—gorgeous galaxies. And as you reflect on these many-peopled spheres may not the thought arise in your mind, can it be that God's Son came down to this insignificant atom of a world, and died for the salvation of such a puny, worthless race as occupy this fraction of creation? "Is it likely," as Dr. Chalmers expresses the doubt in his Astronomical Discourses—" says the infidel, that God would send his Eternal Son to die for the occupiers of so insignificant a province in the mighty field of His creation? Are we the befitting objects of so great and so signal an interposition? Does not the largeness of that field which astronomy lays open to the view of modern science, throw a suspicion over the truth of gospel history? and how shall we reconcile the greatness of that wonderful movement, which was made in heaven for the redemption of fallen man, with the comparative meanness and obscurity of our species?" Thus the difficulty has been stated by one of the most able and eloquent of modern divines; and I believe it is not merely an argument put forward by infidelity, but that it sometimes weighs oppressively on the minds of sincere Christians, disturbing the tranquillity of their faith. Rightly considered, however, it is found to be destitute of weight as a presumptive argument against the credibility of Christianity, and to admit of a satisfactory solution.

When the monarch-minstrel of Israel uttered the sublime words recorded in the 8th Psalm, he seems to have been oppressed with the same difficulty though in a different form—"When I consider thy heavens, the work of thy fingers, the moon and the stars which thou hast ordained; what is man that thou art mindful of him and the son of man that thou visitest him." Looking at the vastness of creation—the limitless provinces of the divine empire—contrasting this with the insignificance of man, can we believe that the Lord of all will care for him in a special manner, make him the object of a parent's love and care, and amid all the diversity of worlds, provide for his individual wants? We reply to this by an appeal to facts. Consider what God has done and is doing for man. He has arranged all the material creation so as to minister to his wants and secure his happiness. For him the sun shines—the moon walks the midnight heavens in her brightness; for him a stately and beautiful home, adorned in such costly array, has been fitted up during long ages; for him the earth pours forth her treasures; he sits at the head of the lower creation having "all things put under his feet." His Creator has made him but "a little lower than the angels,"—gifted him with the power of thought so that he can count the stars,—measure their distances—weigh the sun—track the fiery comet. God therefore has cared for man, as though he were his favoured creature; lavished all the treasures of his parental kindness upon him,"—"crowned him with glory and honour." With solemn and rational joy therefore we may turn to the Son of David and listen to him as he says—"consider the lilies of the field, how they grow; they toil not neither do they spin; and yet I say unto you that Solomon, in all his glory, was not arrayed like one of these. Wherefore if God so clothe the grass of the field which to-day is and to-morrow is cast into the oven, will he not much more clothe you O ye of little faith?" Here is conveyed the true and conclusive reply to the objection. God does care for the meanest thing—decks out in lavish beauty the little humble "lilies of the field"; and will he not "much more" care for man his favourite child—whom he has formed to know, love, and serve Himself, and endowed with immortality. "If the telescope discloses an infinity of worlds whose inhabitants all need the divine care, the microscope discloses a world of littleness stretching away to infinitude beneath our feet—a world of living creatures, exquisitely formed, bountifully provided for, in every drop of water, in every leaf, and blade of grass." And since we know that Omnipotence arranges the delicate tendrils of the coral in the depths of the ocean, and shelters in the everlasting arms the empires of living beings, unseen by the unaided eye of man, that spread themselves within the bosom of the flower or find a kingdom in a single leaf of the forest, is it an incredible tale that he should so care for man, upon whom he has already lavished a parent's love, that he would interpose to save him from the degradation and ruin of sin—that he would condescend to employ his own Son on that great errand of mercy—that he would deliver earth from the darkening curse entailed by sin—and thus wipe away a dark stain from the work of his own hand? Is not such a special interference worthy of a God of love?—is it not what we might expect to flow from the Fountain of Goodness? Who then that knows what God is doing in nature will dare to pronounce the gospel story a fabulous tale? If God provides for the wants of the irrational creatures so carefully will he not provide for the higher spiritual wants of his rational offspring? And if they fall into sin will the God who cherishes the lily in the hollow of his hand, leave his own children to perish? Which, in such a case, is the more credulous—the infidel or the christian? The one points to the manifestation of divine love beaming in every corner of creation; and believes that the cross discloses but another brighter illustration of Infinite Love, consistent with all the other operations of God's hand. The infidel pronounces such special care for man absurd and incredible. He can believe that the Creator lavishes his attention on the circling suns and worlds, which are only masses of dead matter, but refuses to believe that immortal spirit can receive from God a supply for its special wants. But which is greater, the sun or the mind that can measure the sun, underderstand the purpose of its creation—love, wonder, and adore? With all its beauty and magnificence the sun is unconscious, and cannot feel or return its Creator's love. The spirit of man can rejoice in the light of an Almighty Father's smile—can rise from one degree of intelligence to another; and through the mighty roll of eternal ages can approach nearer and nearer the Infinite Intelligence and the eternal love. Greater therefore than all worlds, suns and galaxies, is this earth-robed spirit. Is the redemption of such a glorious being, by the mighty interposition of God's own Son, and his obedience unto death, a work unworthy of Deity—and is the gospel that proclaims it to be reckoned a childish fable? Rather should not the greatness, the worthiness, the moral splendour of redemption, as announced in the gospel, stamp it, in our estimation, as divine! "What is man that thou art mindful of him, and the son of man that thou visitest him?" Truly he is a great and a gifted being—one of God's spiritual family ; and God himself has recognized the importance of man, the infinite value of the soul, in sending his son to redeem and save. The true greatness of man is seen most fully in the cross of Christ.

But what, it may be asked, of the inhabitants of other worlds—are they sinful, and have they been left to perish, while we alone are to partake of the benefits of redemption ?—Or do they share in the blessings of that great work ? Or are they sinless and need no Saviour ? On this subject scripture furnishes us no information ; but I think reason unaided, furnishes a satisfactory answer. We have no reason to suppose that redemption is a work so special that none of God's creatures, in other worlds, should their spiritual need resemble our own, can receive a *similar* special provision. There is no authority in scripture for such a supposition. It may be that the inhabitants of other worlds have not fallen, and require not a Saviour. For aught we know evil has only been permitted to enter this world, that here a new discovery of divine love and infinite wisdom may be made, in the restoration of the fallen, and the wondrous plan by which pardon can be extended to the guilty. And here, on this platform of being, may be resolved the great problem, beyond the solution of created intelligence, how God can be just and yet freely forgive,—how he can be the holy God, and take to his bosom the returning penitent. And is it incredible that the story of the cross may be repeated in other worlds, as a new illustration of "the manifold wisdom of God ?" We know from scripture that it excites the deepest interest in heaven—that "angels desire to look into" the wonders of redeeming love—that Moses and Elijah on the mount of transfiguration conversed with the Redeemer on "the decease he was about to accomplish."* And if it awakens the wonder of heaven, may it not enrapture the inhabitants of these other worlds ? Though they need not the efficacy of atoning blood, will they not if pure and holy, rejoice that the fallen are restored, and adore the riches of redeeming love. If there is "joy in heaven over one sinner that repenteth" —the intelligence must be transmitted instantaneously there : and may it not be imparted, in the same way, to the unfallen creatures who people other regions of God's empire. Man, in paradise, we know, had a freedom and fullness of intercourse with God which we cannot now conceive of ; and if the inhabitants of other worlds are innocent, we may well believe that they too have an intimacy of communion with the Almighty Father unknown to us. And thus the story of redemption may be matter of clear knowledge to them.†

It is a saddening thought to suppose that the inhabitants of other worlds are in the same condition as ourselves—sinning, suffering, weeping. It is enough to cover the firmament with mourning, lamentation and woe ;

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* See Chalmers' Astronomical Sermons.

† Chalmers.

and make us look up at the gorgeous nocturnal heavens and shudderingly exclaim "it is a sad sight." But we have no reason to suppose that sin is a necessary condition of being—that moral evil must exist wherever there are finite creatures. It is not so in heaven—it may not be so elsewhere. But if we suppose the inhabitants of other worlds to be in the same moral relation to their Creator as we are, and to need a Saviour; then we may believe that as redemption was provided for us, so, in some way or other, to us unknown, it will be provided for them. We know how great the love of God to ourselves, as sinners, and we can with unwavering confidence commit them to the care of the same Infinite Love that sent a Saviour to our world. I think these considerations are sufficient to remove all serious difficulties from every candid mind; and show us that, so far from shaking the foundations of our faith, science, with all its brilliant discoveries, is strengthening the bulwarks of Christianity, and laying her brightest trophies at the foot of the Cross.